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Some Researches
INTO THE PHYSIOLOGICAL PRINCIPLES UNDERLYING THE TREATMENT OF INJURIES AND DISEASES OF THE ARTICULATIONS.*

A Lecture delivered before the Physiological Society of the Middlesex Hospital

BY A. G. TIMBRELL FISHER, *M.C.*, F.R.C.S. ENG.,

LATE HUNTERIAN PROFESSOR, ROYAL COLLEGE OF SURGEONS (ENG.), 1921 AND 1922: SURGEON (WITH CHARGE OF OUT-PATIENTS) AND JOINT LECTURER IN OPERATIVE SURGERY, SEAMEN'S (DREADNOUGHT) HOSPITAL, ETC.

AT the present time the need for research into the physiology of the articulations is urgent; it is my desire to awaken interest and enthusiasm in these difficult and important problems, and my hope that others may be induced to attack them.

Why are these problems important? Because very many stiff and deformed joints might have been prevented by a knowledge of physiological principles; moreover, the restoration of movement to the crippled joints is often possible. The science of manipulative surgery is as yet in its infancy. It is folly to shut our eyes to the fact that in many cases the unqualified bone-setter achieves brilliant results. Hard-headed business men who are directors of football teams often send a professional footballer to an unqualified bone-setter as a last resort. The latter performs certain manipulations and the player is frequently able straightway to resume his professional football, although failures may occur.

Let us be honest, and, instead of decrying the good work done by the bone-setter, conduct research into the underlying physiological and pathological principles. We may rest assured that the mists of ignorance will be dispelled when we adopt the method that John Hunter advised to his friend Jenner, who was thinking of investigating vaccination: "Do not think, but try; be patient, be accurate." It has been truly said that the progress of any particular branch of medicine or surgery from empiricism towards the status of a science depends upon an observance of three great principles or foundation stones—accurate anatomical, physiological, and pathological knowledge.

One of the best examples of the truth of this statement is afforded by the advances of late years in the diagnosis and treatment of tumours and other affections of the central nervous system—advances largely due to anatomical research and to physiological experiment, and to observing the precepts and teaching of that great surgeon and physiologist, John Hunter. In the march of progress certain branches have lagged somewhat behind, none more than the branch which deals with the articulations. The Hunterian tradition has been unaccountably neglected, and it is strange that although injuries and diseases of the joints are amongst the commonest of all human ailments, yet there is not only apathy, but also much ignorance of the underlying anatomical, physiological, and pathological factors.

Is there any type of case which the practitioner finds more puzzling and difficult than an obscure affection of a joint? The diagnosis presents often a most difficult problem, as may also the question of treatment. Apart from minor problems, one of the principal questions that the practitioner must ask himself is, "Shall I, in the treatment of this joint case, immobilise, or shall I permit and encourage movement?" If one may attempt a generalised statement, we may perhaps admit that the practitioner errs too often on the side of immobilisation, and hence the far too many deformed and stiff joints that we encounter daily. The bone-setter who employs movements almost as a routine perhaps errs by neglecting rest when this is indicated. However, the bone-setter is fully alive to a great principle which was summed up by a famous French surgeon in the phrase "movement is life"—a phrase which I should like to see framed in letters of gold in the consulting room of every medical man.

A stiff joint is an affliction, one which the public rightly holds in great dread. The speed and skill of the athlete, the grace of the dancer, the power of the musician to charm our ears, indeed, our daily avocations and amusements, all depend very largely upon the smooth and free gliding of cartilage-clad articular surfaces. Can we wonder that when the public are asked to choose between indiscriminate movement by a bone-setter and immobility, which is, alas, often equally indiscriminate, by a qualified practitioner, it not infrequently consults the former? In my own practice I have constantly been faced with the difficuty of deciding which mode of treatment to adopt. It became clear to me that there was an almost complete absence of guiding physiological principles. Is it surprising, therefore, that in the absence of these guiding principles we find that unqualified individuals exist who reap a harvest in the stiff and deformed joints, often due to unfortunate treatment by our professional brethren? The physiology of the joints presents many interesting and important problems, but time will permit me to deal this evening very briefly with two aspects only—viz., the physiology of articular cartilage and of synovial membranes, together with some general principles of treatment.

ARTICULAR CARTILAGE.

In articular cartilage we have a tissue well suited for studying the behaviour of cells under different conditions, since, save in the perichondrium near the edge, it contains no blood-vessels or nerves to complicate the cellular reactions. It, oddly enough, has been rather neglected by the researchers into the cause of tumours, but I believe that it may furnish much light into this difficult problem, particularly as the irregular proliferations which it undergoes in osteo-arthritis are, I believe, intermediate between inflammation and new growth. When investigating such a complicated and difficult problem as tumour formation, it behoves us to begin at the bottom of the ladder, and to study first the simpler forms of cell proliferation such as we see in repair and inflammation. Next we must study with great care the irregular proliferations that occur in certain diseases of known toxic or microbic origin. We shall then see that all these forms of cell proliferation merge gradually into one another, and it may gradually dawn upon us that it is unjustifiable to draw sharp lines of demarcation between them.

Articular cartilage is a substance well adapted for the functions that it performs. It has in health a smooth surface, lubricated by the synovial fluid, thus reducing friction to a minimum. It is of great strength and is elastic, yielding to blows and concussions which might otherwise damage the subjacent bone. Indeed, we may regard bone as a tissue less endowed with vitality than articular cartilage. For when the latter is destroyed by chronic disease, and pressure is still permitted, the bone becomes absorbed. In a Hunterian lecture on loose bodies in joints,[1] I demonstrated that in detached portions of the articular surface which contain both cartilage and bone, and which have been for some time quite free in the joint cavity, the cartilage cells usually retain their vitality, whereas the majority of the bone cells die. This observation has recently been confirmed by Ito, working in the laboratories of University College Hospital. Kuttner's cases of joint transplantation are of particular interest, as in two of them the joints were examined some time afterwards, the patients having died from an intercurrent affection. Microscopic examination showed survival of the articular cartilage, whereas the bone cells were dead.

* The expenses of this research were defrayed by a grant from the Medical Research Council.

[1] British Journal of Surgery, 1920–21, viii., 493.

Axhausen's animal experiments showed practically the same state of affairs; the articular cartilage of the transplanted joint-end lived, whereas most of the cells of the compact bone were necrosed. No true tumours of articular cartilage have been described, and when a malignant growth of the adjacent bone reaches the articular cartilage it is a remarkable fact that the latter forms an almost impenetrable barrier, at any rate for a long period. Can we resist the conclusion that this absence of blood-vessels plays an important part in its immunity from tumour formation? This absence of tumour formation where vessels are non-existent leads us to inquire whether the irregular proliferation of cells that we call tumours may not be due to irritant or toxic substances brought to the selfsame cells through the intermediation of the circulation. I have found experimentally that it is possible to produce small tumours of the lateral part of the articular cartilage by radium.

Experiment 20.—A small glass tube containing 0·0382 mg. radium was introduced into the left knee of a rabbit and fixed by suture against the inner border of the internal femoral condyle near its junction with the trochlear surface. A similar tube but containing 0·15 mg. radium was introduced into the right knee and fixed in a similar position. Nineteen weeks later the animal was killed and the following appearances were noted:—

Left knee: Well-marked proliferation of the articular cartilage at the inner margin of the femoral condyle and trochlear surface. The radium tube had become loose and lay in the supra-patellar pouch.

Right knee: Slight and irregular nodular chondro-osteophyte in same position as in left knee.

It is important to note that the greater amount of proliferation occurred in the left knee—which, however, had contained the smaller amount of radium. I am indebted to Prof. W. S. Lazarus-Barlow for the kind loan of the radium tubes.

Structure of Articular Cartilage.

It will perhaps avoid confusion if we discuss the structure of articular cartilage under two headings—viz., the central and the lateral articular areas. I have endeavoured to show that there is a fundamental difference between the structure and nutrition of these two parts and that this difference is of importance, since it sheds light upon many hitherto obscure pathological phenomena.

Central Articular Area.—It was held by Ogston that the surface cells are degenerate and are in process of being shed into the joint, and that articular cartilage is continually renewing itself by growth of the intermediate zone. Henle has described a delicate layer of cells upon the free surface. If, however, the surface of the *central part* of the articular cartilage be carefully focussed, it will be seen that there is no layer of cells at the actual free surface, but that this is formed of clear matrix with a sharp curvilinear margin. Secondly, the more superficial cells of the articular cartilage, which are flattened conformably with the surface, show no sign of degeneracy and have every appearance of being normal healthy cells. There seems little doubt, not only from analogy with the lateral part of the articular cartilage, but from developmental reasons, that these more superficial cells are the source of origin of the deeper cells and that they behave like the perichondrial cells of costal cartilage. Towards the termination of the second month, the joint cavities have appeared—a split occurring in the mesenchyme. At the fourth month of intra-uterine life the surface of the joint cartilage is still covered by this layer of connective tissue. This is the stage found throughout life in certain birds. With the increasing movements of the child before birth the perichondrial layer gradually recedes from the more central parts of the articular surface, but at birth it still strays for a short distance over its edge. Microscopically, however, the connective-tissue layer can be traced beyond the naked eye delimitation. Shortly after the child begins to walk the extension of the synovial membrane over the lateral margin of the articular cartilage makes a further slight regression, but soon assumes its permanent relationship. No perichondrium is present over the more central part, yet there can be no doubt from a study of their structure, staining reactions, and of their development and comparative anatomy, that these cells have the same function as the perichondrial cells of the lateral part of the articular cartilage, and are the parent cells of the more fully-developed cartilage cells in the deeper parts. In the intermediate zone of the articular cartilage the cartilage cells are arranged in groups and are no longer flattened. In the deeper zone the cells are arranged in columns perpendicular to the narrow subarticular layer of bone upon which they lie.

Lateral Articular Area.—This closely resembles those forms of hyaline cartilage, such, for example, as costal cartilage, which are furnished with a perichondrium, for the synovial membrane gives to this part of the articular cartilage a delicate investment in which well-marked capillaries may be traced. At the edge also the articular cartilage is fibrillated and partakes of the nature of fibro-cartilage. This difference in structure of the central and lateral parts is rendered clear, as we have seen, by a study of the development of a joint and by comparative anatomy.

Nutrition of the Articular Cartilage.

In a paper which has become classical, entitled "Of the Structure and Diseases of Articular Cartilage," William Hunter first described the circulus articuli vasculosis lying near the articular edge and giving delicate offshoots to the lateral part of the articular cartilage. Toynbee did not attach much importance to the circulus as a source of nutrition, but considered that articular cartilage derived its pabulum from plasma exuded from the capillary loops lying in the cancellous spaces beneath the subarticular layer of bone. The synovial fluid has not hitherto been seriously considered as a source of nutrition, but Strangeways, arguing from the increase in size that loose bodies derived from the articular surface undergo while free in a joint, has advanced the view that the synovial fluid is a normal source of nourishment of the articular cartilage. Thus we are faced with three different theories. My own observations lead me to believe that there is an element of truth in each. By delicate injection methods, the subarticular bony layer is seen to be freely permeable by the injection matter, and it is probable that nutrient plasma is also able to permeate this zone and nourish the deeper layer of the cartilage. Laterally the subarticular layer is actually penetrated at certain spots by blood-vessels which can be traced for short distances in the cartilage.

With regard to the rôle played by the synovial fluid, we are faced with the fact that there is no evidence that the analyses hitherto recorded are of fluid obtained from normal joints. Indeed, evidence derived from the data given, with the few analyses hitherto recorded, points to the fact that the fluid was derived from pathological conditions such as synovitis with effusion. Such inflammatory effusions have a somewhat high protein content. The analysis of normal synovial fluid collected by myself in the post-mortem room gave results of considerable interest and may be summarised in the form of a table.

Average Personal Cases.

—	Synovial fluid percentages.		Lymph plasma percentages.
	Human.	Oxen.	Human.
Total solids ..	4·41	2·023	4·2–6·5
Protein content ..	1·6	0·92	3·5–4·3
Mucin	1·95	0·1303	—

In spite of the somewhat low protein content shown in the table, I believe that the synovial fluid nourishes the superficial cells of the central articular area; and this same low protein content accounts for the feeble powers of resistance of this part of the articular cartilage and the readiness with which it undergoes degenerative changes, and the extreme slowness or even absence of repair in the central part of the articular cartilage. I found by systematic examination of joints from the post-mortem room that 80 per cent. of individuals between 50 and 60 years of age and 90 per cent. between 60 and 70 show more or less of fibrillation of the central part of the articular area.

I believe that the deeper layer of the articular cartilage is nourished from the capillaries in the subarticular cancellous spaces, and that the lateral part of the articular cartilage receives in addition a supply of lymph from the capillaries of the circulus articuli vasculosus.

Repair in Articular Cartilage.

The phenomena of repair are a striking confirmation of the views enunciated above. I have confirmed Redfern's experimental findings that incisions in the central part of articular cartilage heal, if at all, with great sluggishness, and that there is an absence of cartilaginous repair. Incisions in the lateral portion, however, exhibit much more active repair, and there is a new formation of articular cartilage in which both cartilage itself and perichondrium participate.

Experiment 18.—A transverse incision was made in the trochlear surface of the femur of a rabbit and through the whole thickness of the articular cartilage. Seven and a half months later the animal was killed, and microscopic examination (Fig. 1) showed little if any sign of repair. It will be seen that the articular cartilage to the right of the incision has undergone necrosis and is being invaded by multinucleated chondroclasts.

This difference is even more markedly demonstrated when the articular cartilage is completely removed with exposure of the subjacent cancellous spaces. Laterally a pannus of granulation tissue derived from the synovial membrane and supplied by the circulus spreads over the denuded zone and assists in forming new cartilage. In the central areas the formation of new cartilage is less marked and occurs through the agency of the connective-tissue cells of the exposed cancellous spaces. In the experiment mentioned above the inner portion of the femoral condyle was chiselled away, leaving a flat surface of cancellous bones. The microscopic appearances as seen seven and a half months later are shown in Fig. 2. On the left side of the drawing may be seen a feeble attempt at new cartilage formation from the exposed cancellous spaces. In the centre and on the right there is an exceedingly marked formation of new cartilage which is largely derived from the perichondrium upon the surface. In addition to its nutritional duties we may therefore regard the circulus articuli vasculosus as a very important factor in the destruction and replacement of diseased cartilage and in the repair of deficiencies in its lateral part. It is the vascular supply of the pannus of granulation tissue which spreads like an advancing tide over the surface of the cartilage in many forms of arthritis.

Compensatory Proliferation of Lateral Part of Articular Cartilage after Destruction of Central Part.

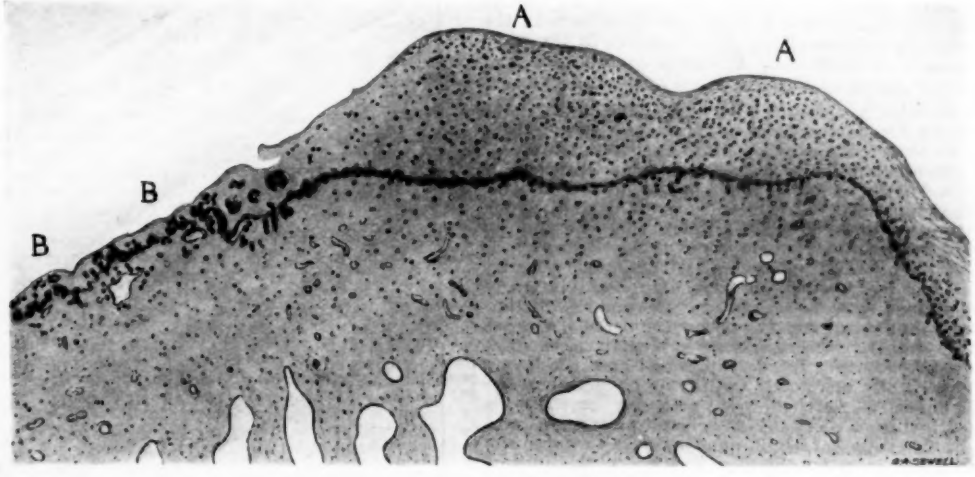
This fact, which I was able to demonstrate experimentally,[2] forms in my opinion one of the most striking examples of adaptation in the human body, and it seems clear that the "lipping" that occurs in osteoarthritis, particularly the traumatic type, is an attempt by the better nourished lateral portions to compensate for the loss of the central parts *by extending the articular surface*. This view, although it may savour of metaphysics, I believe to be of great importance, for it is clear that, if aided by judicious treatment, these osteophytes may play a useful part, and their indiscriminate removal when causing no obstruction to movement is to be deprecated.

I have endeavoured to show that the loss of the central articular cartilage may be due to trauma or

FIG. 1.

Experiment 18 (rabbit). Incision in centre of articular cartilage of trochlear surface of femur after 7½ months, showing absence of repair. Obj. 1/6 in.

FIG. 2.

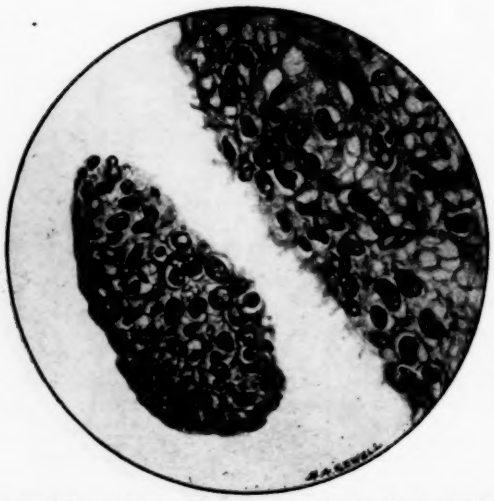


Portion of lower end of femur of rabbit 7½ months after articular cartilage had been chiselled away, with thin layers of subjacent bone. AA, marked reparative formation of new cartilage laterally. BB, feeble formation of new cartilage in the more central zone. Obj. 2/3 in.

[2] Hunterian Lecture, British Journal of Surgery, July, 1922.

to the action of toxic or poisonous substances, and that in the latter case the same toxins may cause degeneration of the poorly nourished central portion of the articular cartilage and proliferation of the better nourished lateral parts. The term toxin is to be used in its broadest sense, and there is evidence that these toxins may be bacterial in origin. There is,

FIG. 3.



Synovial membrane from a case of chronic synovitis showing active mucinogenesis in synovial cells. On the left a villus is seen in transverse section. Obj. 1/12 in.

however, a danger of emphasising the importance of bacteria in the ætiology of disease. The occurrence of osteo-arthritic changes in certain disorders of the ductless glands, and its frequency at the menopause, certainly suggest that the toxins are due to failure of a ductless gland or glands to supply some links in the chain of metabolic endogenous products, or that possibly by this same failure the resistance of the patient to infection may be thereby lowered. There is evidence also that osteo-arthritis may be due to auto-intoxications such as those due to defects in the excretory apparatus or the accumulation in the body of products of normal or abnormal metabolism.

Mode of Access of Nutrient Fluid to Cartilage Cells.

No definite lymphatics with endothelial lining have ever been demonstrated in articular cartilage. How, then, do the cartilage cells obtain their nourishment? The intercellular material of articular cartilage is composed of mucin and collagen in various proportions. If articular cartilage is stained by carbol-thionin, which stains mucin pink, it will be found that the zone of matrix immediately surrounding the cell groups is stained deeply and is evidently the most recently formed and more mucinous part. On examination of a well-stained section the pink zones branch and communicate and form a network surrounded by a series of more faintly stained zones evidently formed of collaginous matrix. In the superficial area the layers are horizontally arranged, and in the deeper zone the arrangement is vertical. If articular cartilage is steeped in brine, these layers become prominent, and if it be fractured at right angles to its surface, the arrangement in perpendicular fibres like the pile of velvet is very striking. There is strong evidence from the nature of the earlier changes in osteo-arthritis that there is a solution of these same mucinous paths and that the fibrillation is due to the persistence of the columns of more collaginous matrix.

PHYSIOLOGY OF THE SYNOVIAL MEMBRANES.

It is quite impossible in the time at my disposal to give more than a brief summary of my researches into the structure and functions of the synovial membranes. I find that this membrane differs markedly in its structure at different situations in the same articulation. At the parts most remote from the articular edges it consists of a single layer of endothelial-like cells which in places surround openings or stomata. Beneath the endothelial layers is a layer of loose connective tissue rich in capillaries, nerves, and lymphatics. Here and there the endothelial layer is absent, and at these spots the loose connective-tissue layer abuts directly upon the joint cavity. This absence of a complete endothelium may account for the grave toxæmias of acute suppurative arthritis.

Nearer the articular margins the endothelial layer is very deficient, as it is also at the margins of the villi—the latter being almost exclusively confined to the portions of the membrane nearest to the articular margin. The most striking feature of the membrane in the latter situation and in the villi is the presence of great numbers of deeply staining, oval or round, connective-tissue cells, which may form superimposed layers. The nuclei of these cells are spherical or oval and of the reticulated connective-tissue type. The function of these cells appears to be the secretion of the synovia, and the absence of a complete endothelial layer readily allows the synovia, assisted by the joint movements, to escape into the joint. On staining synovial membranes with carbol-thionin (Fig. 3) I discovered globules of mucin in the cell bodies, and every stage of transition between well-marked granules and definite droplets of mucin may be seen. In some cases the cell can be seen to be distended with mucin and the nucleus compressed.

I believe that the mucin gains the joint cavity in three distinct ways: (*a*) The cells at the surface discharge their mucin into the joint cavity. (*b*) Certain of the deeper cells discharge their mucin into the loose connective-tissue spaces of the villi, whence it is squeezed out by the joint movements. (*c*) In chronic synovitis, and possibly in normal joints, portions of the surface layer of the membrane are detached and the mucinous transformation takes place in the joint cavity; the cell bodies forming the cellular débris normally present in the synovial fluid. In some, cartilaginous transformation can be seen to be taking place.

FIG. 4.

End-bulb of nerve between tendon fibres attached to patella. (Drawn by Dr. R. J. Gladstone.) Obj. 1/6 in.

The membrane surrounding certain fatty processes projecting into joints, such as the infra-patellar pad of fat, is so richly furnished with these secreting cells that the name "synovial glands," originally given to them by Clopton Havers, seems amply justified. There can be little doubt also that, as Havers suggested, the pressure caused by the normal joint movements causes

an increased outpouring of mucin. This fact was proved by Freidrichs, who examined the synovial fluid of oxen after rest and after exercise. Whether there is, in addition, a nervous mechanism, it is impossible at present to state. That this is the case is, however, suggested by the interesting condition of intermittent hydrathrosis. In addition to the power of secreting mucin, which is a pure lubricant, we must not forget that the synovial membrane allows the transudation from the rich plexus of capillaries with which it is supplied of the albuminous fluid which, in my opinion, nourishes the central superficial area of the articular cartilage. It is not generally realised that the synovial membrane is richly supplied with nerves. By special staining methods I have observed delicate nerve fibrils forming a plexus in the sub-endothelial layer, also a further plexus immediately beneath the secretory layer of cells. Connecting these two plexuses are delicate fibrils, and in certain of the villi I have observed end bulbs (Fig. 4). Nicoladoni described Pacinian capsules in the articular capsules in the rabbit. I have observed similar bodies in man in the anterior wall of the supra-patellar pouch lying immediately beneath the synovial membrane. It is highly probable that many of the nervous phenomena that occur in certain joint diseases, particularly in rheumatoid arthritis, are reflexly produced and are caused by inflammatory involvement of the synovial nerves and nerve-endings. These nervous phenomena are often so prominent that by many the disease is considered primarily "neurotrophic" in nature, but it seems more probable that the vasomotor and articular symptoms are due to the action of some common cause.

Physiology of Absorption by the Synovial Membrane.

That master physiologist, Claude Bernard, wrote in 1859 with regard to the synovial fluid, "les données physiologiques sur ce liquide sont à peu près nulles: le siége anatomique de sa sécrétion est lui-même très peu connu." These words are well-nigh as true to-day as when they were written more than 60 years ago, and otherwise exhaustive treatises on physiology dismiss the subject in a few lines as one of no importance or interest. The behaviour of the synovial membrane towards various fluids differs considerably with the chemical and physical composition of the latter. In this part of my research I have received helpful suggestions from Dr. Bolton, whose work on absorption from the peritoneal cavity is well known. I propose here merely to recite a few typical experiments.

Absorption of Isotonic Solutions.

Experiment 6 (old series).—In this experiment I was kindly assisted by Prof. S. G. Shattock. The needle of a 5 c.cm.; syringe was inserted obliquely into the inner side of the supra-patellar pouch of an anæsthetised rabbit; 1·5 c.cm. of a sterile solution of isotonic potassium iodide was then slowly injected until the joint became tense. Absorption appeared sluggish at first, but, after alternate flexion and extension of the joint, which was repeated several times, there was appreciable slacking of the joint tension. Sufficient fluid was then injected again to distend the joint cavity. The experiment was continued for five hours, and at intervals of 15 minutes 1 c.cm. of the solution was introduced. The total amount of isotonic potassium iodide absorbed during this period was about 20 c.cm. Urine collected from the bladder at the termination of the experiment gave the typical starch reaction, showing that the potassium iodide solution had been absorbed by the synovial membrane and finally excreted by the kidney. The experiment also demonstrates the important part played by movement in assisting the absorption of the fluid. It is obvious that this process of absorption might have occurred by means of either the capillaries or lymphatics, or possibly both may have played a part. A further series of experiments was performed in an endeavour to ascertain the respective part played by these different elements. These experiments are as yet incomplete, but it is possible to state a few preliminary observations.

Absorption of Diffusible Dyes.

Experiment 9 (old series).—The above experiment was repeated, using a solution of Berlin blue; 2 c.cm. were injected into the joint, gentle movements were instituted, and after a short interval a further 1 c.cm. was injected. At the completion of the experiment the animal was killed and the joint opened and examined. A small quantity of the Berlin blue solution remained in the joint. There was a generalised diffuse staining of the membrane present, more marked in the supra-patellar pouch. On further examination it was seen that the dye lay in the sub-endothelial layer of the membrane, but no injected lymphatics could be detected either proximal or distal to the joint. Microscopic examination of a portion of the membrane from the supra-patellar pouch showed an absence of lymphatic injection save at one small area. This experiment would appear to point to the fact that diffusible dyes are somewhat rapidly absorbed by the capillaries into the venous circulation and only to a slight extent by the lymphatics.

FIG. 5.

Demonstration of lymphatics of synovial membrane by injection of colloidal silver into knee-joint of a living rabbit. The lymphatic glands along the iliac vessels and abdominal aorta also strikingly demonstrated. Obj. 1/6 in.

Absorption of Colloidal Dyes of Greater Molecular Composition.

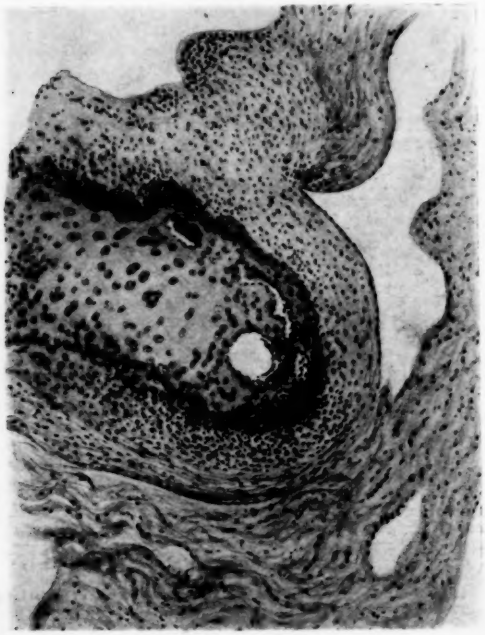
(*a*) *Berlin Blue and Mucilage of Tragacanth. Experiment 1* (new series).—A saturated aqueous solution of Berlin blue mixed with an equal quantity of mucilage of tragacanth was prepared to approximate as closely as possible to the composition of normal synovial fluid; 1·5 c.cm. were injected into the knee-joint of a rabbit; the animal was allowed to move freely about, and was killed in five hours. It was found that absorption by the lymphatics had certainly taken place, for microscopic examination of the membrane revealed these clearly. No obvious staining of the lymphatic glands was detected. The striking thing, however, was that the whole of the circulation of the animal was stained a vivid blue, showing that absorption by the capillaries had readily occurred.

(*b*) *Colloidal Silver. Experiment 4* (new series).—Adopting a suggestion of Dr. Bolton, a solution of 2 per cent. colloidal silver in normal saline was injected into both knee-joints of a rabbit. The animal was allowed to move about freely until killed five hours later. The synovial lymphatics were thus demonstrated in a very striking manner (Fig. 5) the colour varying from dark brown to black. Furthermore, the popliteal gland, the lymphatics along the course of the femoral vessels, the iliac glands, lymphatic vessels along the course of the abdominal aorta, and even glands near the entrance of the thoracic duct, were demonstrated. There was a certain amount of absorption into the general circulation, but it is not possible at present to state whether this was due to absorption of colloidal silver by the synovial capillaries directly into the blood stream or whether the silver had gained access to the circulation through the thoracic duct. It is probable that both occur, but that in the case of such colloidal substances the principal route of absorption is through the lymphatics.

I was able to prove experimentally that movement, as in the case of the isotonic solutions and diffusible dyes, plays a very important part in the absorption of colloidal silver.

In another series of experiments a similar quantity of colloidal silver was injected into the knee-joints of two rabbits. In one rabbit the joint was immobilised, whilst the other was allowed to move freely about. At the end of a fixed period of time both animals were killed. It was found that in the immobilised joint the lymphatics in the synovial membrane could usually be demonstrated, but no proximal lymphatics or glands were stained. In the case of the animal in which movement had been permitted, the proximal lymphatic vessels and glands were

FIG. 6.



Transverse section through experimental loose body after 7½ months. The difference between the original cartilage and that formed upon it by the synovial membrane which surrounds it is very striking. Obj. 2/3 in.

demonstrated by the colloidal silver in a very beautiful manner. As an instance the following experiment may be quoted.

Experiment 5 (new series).—Rabbit B: 1·25 c.cm. of colloidal silver (2 per cent. in normal saline) injected obliquely into supra-patellar pouch of right knee at 10.30 A.M. No obvious extravasation occurred and puncture was sealed with collodion gauze. The animal was permitted to move about freely on recovering from the anæsthetic and was killed at 12.8 P.M.

Rabbit A: Similar injection made into the right knee at 10.50 A.M., but animal was kept under anæsthetic and no movement occurred. it was killed at 12.28 P.M.

Post-mortem examination: Diffuse staining of synovial membrane present in the injected knee of both rabbits. In Rabbit A no lymphatic glands or lymphatics proximal to the joint were stained, whereas in Rabbit B, in which movement had been permitted, the popliteal gland was stained a dark brown, the iliac glands on the right side were stained a light brown, and there were a few faintly stained lymphatics along the abdominal aorta.

The practical lessons that these preliminary experiments appear to teach will be touched upon later. I am indebted to Prof. Shattock for verifying the presence of lymphatics in microscopic preparations of the synovial membrane.

Behaviour of the Synovial Membranes towards Foreign Bodies.

In some previous experimental work upon the loose bodies occurring in joints I found that a detached portion of the articular surface almost invariably became attached to the synovial membrane, and that the latter surrounds it with a connective-tissue sheath. This sheath has, however, a very remarkable quality. It has the power of laying down layer upon layer of cartilage (Fig. 6) and even bone upon the surface of the body, until, occasionally, veritable tumours are formed. In many cases these bodies may later become detached from the membrane and continue their growth while quite free in the joint and deriving their nourishment from the synovial fluid. The nutritive value of the latter is, however, often increased by inflammatory exudate.

An enormous literature has developed concerning loose bodies in joints. Moreover, they have been a pathological puzzle for many generations. I may humbly claim to have been the first to attack the problem from the experimental point of view, and I was gratified when a Japanese investigator, Dr. Ito, working in the laboratories of University College Hospital Medical School, confirmed my experimental findings two years later.

SOME APPLICATIONS OF THE ABOVE PHYSIOLOGICAL PRINCIPLES TO TREATMENT.

1. *The Rôle of Rest.*

It may be considered an axiom that Hilton's dictum, "Rest inflamed structures," should be applied to most cases of acute inflammation affecting a joint. There are, however, certain reservations to be dealt with below. We must, in addition, constantly bear in mind that the function of a joint is movement, and that Nature's method of cure is by ankylosis and often ugly deformity. The policy of leaving the matter entirely to Nature is heartily to be deprecated. Deformity must be prevented by extension or other methods which prevent that spasm in which the powerful groups overcome the weaker and cause deformity. The limb should be placed, as Sir Robert Jones has so often pointed out, in that position which, should ankylosis occur, is of the best functional advantage to the patient, whose occupation and amusements should, moreover, be carefully considered.

We are too often apt to rest content with such ankylosis, but by instituting earlier movements very cautiously and gently when the acute symptoms are subsiding we may be able to retain a useful degree of movement. This does not, however, apply to tuberculous arthritis. The risk of lighting up the disease and of general dissemination is so great that, except in certain very chronic forms, absolute immobility of the joint should be maintained for several months after all acute symptoms have subsided. Even in these cases, however, by suitable treatment our ideal of a movable joint may be obtained where advanced destruction of articular surfaces has not occurred. In the non-infective types, such as traumatic synovitis, sprains, &c., a combination of rest and skilfully applied movement is of great advantage. For instance, in a case of traumatic synovitis of the knee rest in bed or on a couch to avoid weight-bearing and undue irritation is advisable at first; but massage and gentle movements not only allay pain but cause the more rapid absorption of intra-articular effusion and prevent subsequent stiffness. This is combined with elastic pressure and firm bandaging over a thick layer of wool completely surrounding the joint. In a case of severe sprain of the wrist rest from active use of the joint and of the hand is indicated at first, but massage and gentle passive movements may be instituted at once.

2. *The Rôle of Movement.*

(*a*) *Acute Inflammations of Joints.*—The rôle of movement in acute inflammations of joints is naturally a limited one. In cases where the articular cartilages have been destroyed the pain and spasm produced by even the slightest movement are so intense that it is ruled out of practical politics. Furthermore, there is serious risk of general dissemination. However, in cases where the suppuration is largely limited to the synovial membrane excellent results may accrue, if free drainage is provided. The pioneer work of Willems is of interest in this connexion. I recall a case of suppurative arthritis of the knee-joint, treated thus during the recent war, which I have been

able to follow up. Two long lateral incisions were made for drainage, and the posterior compartment of the joint was also opened up by lateral incisions in the popliteal space, through which the joint cavity was periodically irrigated with eusol. In spite of every care the patient's condition deteriorated, and it became obvious that unless the recognised alternative of amputation was performed his life was in jeopardy. I determined to try the effect of movements of the joint. Although these were of necessity painful, the condition was explained to the patient and he loyally and intelligently coöperated. At the first movement there was a gush of pus from the drainage sites, and this was noticed at each subsequent movement. The patient recovered with a full and painless mobility. I had an opportunity of examining him a few months ago. The joint appeared perfectly normal, and to demonstrate its excellent function he hopped round my consulting-room on the previously affected limb. If this case had been treated in the recognised manner it is certain that amputation would have been necessary. It seems clear that the rationale underlying this treatment depends not only upon the prevention of ankylosis but upon the improved drainage that occurs. During flexion and extension certain synovial recesses are compressed and others cease to exist, and the pus, taking the line of least resistance, escapes via the openings for drainage. If the latter did not exist there would undoubtedly be risk of diffusion of the septic material along intermuscular planes.

(*b*) *The Rôle of Movement in Chronic Non-tuberculous Arthritis.*—It is difficult to have a better example of the principles we have enunciated than in the treatment of those exceedingly common diseases of the joints, osteo-arthritis and rheumatoid arthritis, or, as I prefer to call them, modifying slightly Nathan's nomenclature, chronic arthritis of the chondro-osseous and synovial types respectively. What is the result of *complete* rest in these chronic inflammatory conditions? The synovial membrane and capsule undergo sclerosis, movement is still further obstructed by osteophytes developing at the articular margins, there is secondary shortening of tendons and other periarticular structures, and the joint slowly but surely becomes more and more fixed, often in a position of gross deformity. There exist thousands of men and women who drag their stiff and deformed joints from one spa to another and whose deplorable condition might have been prevented by remembering the dictum that "movement is life." These deformities are nearly all preventable by attention to three main principles, and it is unfortunate that many text-books still speak of the stage of "sequels" as if the latter were inevitable and unpreventable. These principles are as follows:—

1. The joint or joints should be put through the full range of movement daily *although over-exertion is to be avoided*, every effort being made to preserve the nutrition of the joint structures and to maintain muscular tone.

2. In most articular cases, particularly in the lower extremity, the principle of diminution of intra-articular pressure is to be observed.

3. The cause must be simultaneously attacked. There is no greater misapprehension than to imagine that chronic non-tubercular arthritis is of necessity a disease which steadily progresses. I have seen very many cases in which the disease has ceased, and it should be a point of honour with our profession so to act that when this happy result accrues the patient still retains a movable joint. The movements, in addition to preventing scarring of the soft parts, cause the osteophytes to develop in such a way that they do not interfere with movement. In other words, it is possible to train up an osteophyte in the way it should grow. It is not sufficiently realised that in many of the aforementioned sufferers the disease has come to an end and that their symptoms are caused by the deforming stiffness. Medical treatment is of doubtful benefit in this type of patient. The locked joint is crying out for movement. This can be restored by various surgical measures, but particularly by manipulation, a most valuable procedure in suitable cases. The results are sometimes almost dramatic; patients have been restored from lives of painful crippledom to comparatively painless activity. One with very marked changes in the hip-joint is now able to run and even jump (Fig. 7).

Another helpless cripple in whom both hip-joints were affected and who had received every imaginable form of medical treatment and had visited most of the spas in England and Europe is now, after tenotomy of the adductors and manipulation, able to ride a horse and swim.

Manipulation is not advisable in the more acute forms, as it may give rise to a reaction, after which the joint gradually stiffens once more. It is never necessary, and it may be dangerous, to use extreme force. Such a procedure, especially in feeble or debilitated individuals, may be associated with considerable shock, and in these cases it is well to be contented with gradual restoration of full movement by repeated manipulation. Whole-hearted coöperation by the patient in the after-treatment, which may be long, and optimism on the part of the surgeon, are invaluable adjuncts. It is obvious that where movement is obstructed by osteophytes, and in certain other cases, open surgical operation may be indicated. I do not propose, however, to deal with operative treatment now.

FIG. 7.

Showing the degree of active flexion of the right hip after manipulation in a patient with marked osseous changes in the joint. Although previously crippled and subject to severe pain, the patient is now leading an active and comparatively painless existence.

In rheumatoid arthritis, where there is a still greater tendency to limitation of movement, the same lines of treatment are indicated. If anything the indications are even greater, since there is a special tendency in this disease for adhesion between articulating surfaces to occur.

(*c*) *The Rôle of Movement in Chronic Synovitis with Effusion.*—It has long been known that pressure is a valuable factor in bringing about the absorption of "water on the knee" and other joint effusions. The experiments with colloidal silver cited above furnish corroboration from the laboratory of the valuable and important rôle played also by movement in the absorption of an intra-articular effusion. We should bear in mind, however, that the amount of movement should be carefully regulated; for excessive movement will almost certainly cause an inflammatory reaction with the outpouring of an increased amount of fluid.

(*d*) *Early Movement in Injuries or Fractures Involving Articular Surfaces.*—When an injury has caused a loss of substance of the articular cartilage, with exposure of the subjacent cancellous bone, in the absence of movement the irruption of connective

tissue from the exposed cancellous spaces is apt to form a bond of union with the opposing articular cartilage. If there is a corresponding loss of articular cartilage on the opposed surface, such adhesion is even more likely to occur. Early movement is imperative in such cases, and there is no evidence that movement, however early, militates against repair of the articular surfaces. I have ascertained experimentally that after excisions of portions of the articular surfaces followed by immediate movement repair proceeds normally. I endeavoured to emphasise in a paper read at the first Congrès International de Médecine et de Pharmacie Militaires, held at Brussels, that the principle of early movement applies with special emphasis to cases of gunshot wounds of joints in which primary union without septic complications has occurred. Such results were not impossible by taking pains and by careful surgery, and it was galling when a stiff joint resulted from improper after-treatment over which the operator had no control. The following case illustrates this point:—

Lieutenant A. was admitted to a C.C.S. August 10th, 1918, with a perforating shell wound of the left knee-joint. The missile entered at the outer side of the ligamentum patellæ, traversed the anterior compartment of the joint in an upwards and inwards direction, and emerged through the quadriceps tendon 1 in. above the patella. In its course the missile caused commnution and loss of substance of the outer fourth of the patella. The edges of the entrance and exit wounds were completely excised, including the affected portions of synovial membrane. Many small loose portions of bone were removed from the joint cavity. Troublesome oozing from the fractured patellar surface was stopped by means of Horsley's wax. Some little trouble was experienced in closing the lower opening in the synovial membrane, but eventually, by undercutting, the external semilunar pad was utilised and a satisfactory closure made.

This officer's subsequent progress is indicated in the following extracts from letters:—

August 26th, 1918 (he writes from a London Hospital): "I left the C.C.S. on the 11th and went down to No.— General Hospital. The doctor there was rather surprised when he saw my knee. He said I was very lucky and marked me for 'Blighty.' I left the next day. Last Tuesday a medical board decided I would be fit for home service in three months and G.S. in six months." Oct. 29th, 1918: "The leg is practically stiff at present. I have had no actual treatment for five or six weeks. Whether they are going to massage or not I don't know. At present they seem to be leaving it alone and allowing the leg to gradually regain strength. There is no pain at all. Do you think it will remain stiff?"

In June, 1921, he writes as follows:—

"You will be disappointed to hear that my knee is still stiff. The range of movement is practically nil, but on the other hand it is never painful or swollen. The wound remained aseptic throughout . . . The leg was left in the splint for three months, and although I asked the doctor what they were going to do as regards massage, nothing was done. Finally I persuaded another doctor to send me to the massage department, where they told me I had come too late. The leg was then quite stiff and immovable. I asked to be invalided out, as I was anxious to get back to work."

Such a story, only too common during the war, was obviously due to lack of even the most elementary knowledge of physiological principles. The principle of early movement in the case of fractures into joints associated with complete solution of continuity of the contiguous shaft is equally important, although to attain it sometimes taxes the mechanical skill and ingenuity of the surgeon to the uttermost. The war gave a great impetus to this problem. Willems, in a paper read at the aforementioned congress, emphasised the rarity of the indications for the classical treatment of such cases by immobilisation in pre-war types of splints and urged the adoption of extension applied directly to the lower fragment of the fracture. This, among other advantages, made possible the mobilisation of the joint from the start. In the non-compound fractures into joints met with in civil life the same early immobilisation may be allowed by operative fixation of the fragments in suitable cases.

(*e*) *Early Movement after Excision with the object of obtaining Movable Joint or Arthroplasty.*—There has been much discussion concerning the nature of the flap to be interposed in the latter procedure. My own clinical and experimental experience causes me to question whether the principle of early movement does not far transcend in importance any considerations concerning the nature of the flap. Are the reasons put forward in favour of arthroplasty based upon really sound scientific foundations?

It is argued that the interposed medium secures easy gliding of the new joint surfaces upon one another, prevents synostosis, and causes the formation of a new synovial cavity. It may be argued, however, that provided early movement is instituted, Nature very rapidly repairs the exposed cancellous spaces—a connective-tissue covering being formed partly by ingrowth from the periosteum at the periphery, and partly by an eruption of connective tissue from the cancellous spaces. I found, moreover, that gradually this connective tissue layer became converted into cartilage, which may eventually mimic somewhat closely normal articular cartilage.

In reply to the second argument we would ask whether early and sustained movement may possibly be more effective in preventing union than interposition of various substances. The argument that the fascial flap is necessary for formation of a new synovial membrane appears somewhat unsatisfactory when we consider that the connective tissues are perfectly capable of constituting quite excellent synovial membranes without any outside assistance as we see in false joints

I wish not to condemn arthroplasty, but merely to point out that we stand in need of further research into this problem.

In conclusion, let me state my conviction that much work remains to be done before the surgery of the articulations rests upon firm foundations.

Some Common Conditions

REQUIRING

ANTE-NATAL CARE.

A Post-Graduate Lecture delivered before the Fellowship of Medicine

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ANTE-NATAL care is a subject on which so much has been written that there is little ground still unexplored. To-day I propose to consider some of the commoner conditions met with during six years of fairly intensive ante-natal work rather than attempt to deal exhaustively with any one particular section, and to state my personal views for what they are worth, rather than to give a summary of other people's views. Naturally there will be many conditions which I shall not even mention.

The majority of patients attending the clinics were suffering from the minor ailments of pregnancy, gastro-intestinal disturbances being probably the commonest. Of the many remedies for excessive vomiting—not the full-blown hyperemesis gravidarum where the patient is seriously ill and obviously in need of institutional treatment, but for the much commoner variety which merely makes life a burden—I have found the ordinary mist. aperiens alba in about one-quarter to one-eighth of the usual dose, given in several ounces of water, to be so reliable that patients rarely neglected coming back steadily for supplies; and as this meant waiting for sometimes two hours on a draughty landing, my opinion of mist. alba remains high. In other cases, particularly when I thought there was a toxæmic element, Burney Yeo's chlorine mixture has proved of value; the fact that patients continue to take it steadily is sufficient evidence of their opinion.

CONSTIPATION IN PREGNANCY.

Constipation is particularly common in pregnancy. In the poorer classes seen at ante-natal clinics there was little use in giving elaborate directions as to diet, &c.; only too often when a patient attended irregularly the reason was found to be the lack of the few coppers to pay for the medicine, and considerable difficulty was experienced in persuading them to accept anything gratis. Patients' statements of the condition of the bowels require to be received in a critical spirit—the daily evacuation of a few small, hard pellets is, to some, satisfactory evidence that all is well. One lady was not to be shaken from her statement that the bowels acted "regularly"; as her colon was throughout several inches in diameter I was sceptical and inquired—humorously, as I thought—"About once a fortnight?" to which she replied, "Yes, doctor, about that." Sometimes one can only get the reply that the bowel acts "regularly," and further questioning reveals this "regularity" to be in relation to a dose of medicine. Castor oil in particular seems to have some special virtue in the popular regard because one was frequently asked, "When am I to take the oil?" Whether the medicine was taken daily, weekly, or at some irregular interval was usually quite unknown. In such cases, in fact I may say that in the majority of cases, I just took it for granted that the patient was constipated.

A wide choice of drugs is available for the treatment of constipation. As I have indicated, the majority of general and dietetic measures were usually out of the question, and I eventually came to rely chiefly on the mist. alba supplemented by the B.P. pil. aloes et ferri. Aloes is, unfortunately, reputed to have some deleterious effect in pregnancy: after watching the effects of these pills continued over prolonged periods in some thousands of cases my only objection is the inefficiency in a fair number of cases, even when given thrice daily. In such cases pil. colocynth. and hyoscyamus usually proved effective, but even then one had sometimes to give two or even three daily. Where flatulence was distressing a rhubarb and soda mixture was usually substituted for the mist. alb., and I found it acted best when given in hot water after food. Probably about nine-tenths of the cases required, or at any rate received, treatment for constipation, intestinal stasis, and fermentation.

There is great divergence of opinion as to the part played by constipation in the production of disease; personally I am quite satisfied that it is an important factor and that it is responsible for many of the discomforts, and possibly for the origin at least of some of the toxæmias of pregnancy.

ECLAMPSIA, DYSTOCIA, &c.

It is interesting to note that out of about 6000 pregnant women who attended the ante-natal clinics at all regularly not one developed eclampsia. I do not, of course, include patients who attended for the first time with obvious pre-eclamptic symptoms. Such cases were sent at once into hospital or the rest home for adequate treatment. The significance of this is even more striking when I remind you that eclampsia is reputed to occur about once in every 500 pregnancies.

Frequency of micturition is another common complaint, and one for which sometimes no apparent cause can be found. This complaint is often relieved by mist. alba. Why this should be so is not quite clear; it is certainly not due to any resulting looseness of the bowel draining off the fluid, as the small non-purgative doses usually act best. Another unexplained curative effect is that of sodium bicarbonate on the cramps of which complaint is so often made: the cramps that occur in the hip and thigh and are sometimes said to be due to the pressure of the head or the uterus on the lumbo-sacral plexus. I am rather sceptical about this explanation, as the cramps occur chiefly at night, especially when the patient lies on the affected side, which, by the way, remains usually constant. Were they due to pressure, one would expect this to be increased in the day-time and relieved by lying down; when lying on the side the uterus tends to fall away from the pelvis, as is so well seen in the Sims position; and further, one would not expect the bicarbonate to have any effect.

Another direction in which ante-natal supervision is of great value is in the prevention of dystocia. The ease with which the usual external measurements of the pelvis can be made is, I fear, closely paralleled by the rareness of cases in which they are made by the majority of general practitioners. The easily recognised gross pelvic deformity usually carries with it its direct appeal for special treatment in nursing home or hospital. The difficulty—from the point of view of preventive medicine—arises in the less easily recognised minor degrees of contraction and the cases of contracted outlet, and is best met by a full examination in the neighbourhood of the thirty-sixth week of pregnancy. The height of the fundus verifies the period of gestation; previous measurements of the pelvis are confirmed, the position, &c., of the baby determined, the fœtal heart sounds heard, and the head used as a pelvimeter—the best pelvimeter, as Pinard states. My experience is that at the thirty-second week or even earlier the head usually lies in the pelvis—that is, with its greatest diameter below the brim. One can easily demonstrate that with a patient in the recumbent posture the sacral promontory is rarely more than 1 in. below the level of the symphysis pubis, and that in pregnancy the highest point of the head—highest, that is, from the horizontal couch—is rarely 1 in. above the horizontal level of the symphysis.

When the head is not in the pelvis at 36 weeks it may be due to the laxity of abdominal and uterine walls after frequently repeated pregnancies, in which case one can easily press the head into the pelvic cavity, or else to some degree of disproportion which is not necessarily a bar to a spontaneous labour. In this connexion I remember a primigravida with a diagonal conjugate of 3¾ in. and the fœtal head overriding the brim at the thirty-fourth week. She was examined with similar result several times during the next month and was admitted in labour the day before the date arranged for admission for Cæsarean section. The head was then in the pelvic cavity, and she expelled spontaneously a fine 8¼ lb. baby.

PELVIC CONTRACTION.

Having arrived at a diagnosis of pelvic contraction, the best means of delivering a living baby is to be sought. In the grosser degrees where the head cannot reasonably be expected to pass the only safe course is to arrange for Cæsarean section; in the lesser degrees the problem is more difficult. On the one hand all cases can be allowed to go into labour—under supervision—and when the head does not come down satisfactorily can be assisted either with forceps or by version, or Cæsarean section can be performed. On the other hand, the patients may be watched and labour induced prematurely in suitable cases; in those not suitable for induction Cæsarean section may be arranged.

If the first course be followed, there will be many emergency Cæsarean sections with the increased maternal risk attached thereto; forceps or version in emergency will be applied oftener and increase considerably the risk of stillbirth. Further, there being little need to keep the patients under close observation, they do not attend regularly, do not realise their danger and the need to report at hospital as soon as labour begins. Very naturally they desire to have the labour at home where they engage a midwife. A doctor is called in, and, sometimes after vainly trying to deliver, sends the woman into hospital, too late for anything but a craniotomy. If the other course is followed the Cæsarean sections will be less numerous, as they will be usually at a pre-arranged convenient time, and there will be few emergencies. The maternal risk from induction, properly carried out, is

infinitesimal, and very much less than that in the forceps cases, &c., in the other series.

To obtain good results in induction cases requires prolonged and accurate observation, combined with the utmost delicacy of judgment as to the time chosen. The baby must be sufficiently well developed for its prematurity not to be a danger; that is, it should be within four, or in a few cases five, weeks of term. It must not be so large that natural expulsion is unlikely; the premature head is usually insufficiently ossified to withstand the forceps, and any obstetric interference considerably increases the intra-natal death-rate. Weekly observation of the relative size of the head and pelvis will indicate the best time for the induction: that is when, during the last month of gestation, the head is just rising out of or can no longer be pressed into the pelvis. The moulding which occurs during labour will permit of the engagement and transit of the head, now grown too large, in its natural shape, to remain in or to enter the pelvis.

The pelvis with contracted outlet has caused me the greatest difficulties and anxieties. I have never been satisfied with the accuracy of my measurements between the ischial tuberosities. The thick pad of tough fat which prevents discomfort when sitting on a hard surface equally prevents the definite marking of points from which to measure. At one time I believed that I had found a means, apart from vaginal examination, of recognising this type by an unusually large difference between the interspinous and intercristal diameters—say 2 to 2½ in., coupled with an external conjugate of 8 in. or more. While I am satisfied that this type of measurement signifies contracted outlet, I am equally satisfied that a pelvis with a contracted outlet may have the above measurements normal, and that vaginal examination is the only means of recognition. Radiography offers a promising field for investigation and confirmation. Further, I have an impression that this type of contracted pelvis is on the increase; at one time it was rarely noted, but now it is constantly being found. I do not think that the difference is due purely to fuller investigation.

Accurate measurement of the degree of contraction of the outlet being, so far as I am concerned, impossible, it may be difficult to decide sometimes whether natural delivery is probable or not. As a general rule a good idea may be formed after careful palpation of the pubic arch, ischial tuberosities and spines, and, as Whitridge Williams has shown, the amount of room between the tuberosities and the sacrum; the further back the sacrum the better chance of successful delivery. In a doubtful case one has to balance the risks of a stiff forceps delivery with unavoidable damage to the head, of a severe perineal tear—possibly through the sphincter requiring secondary repair at some future date—against those of a straightforward Cæsarean section, and I think there can be little doubt that the latter are the less.

Some patients come with a history of abnormality in earlier pregnancies or labours, and for some, of course, nothing can be done. I remember one patient who was sent because her first baby was an anencephalic. Malformations, of course, tend to recur in succeeding pregnancies, and are probably due to some inherent defect in the sex cells. This patient's gastro-intestinal disturbance was kept under control, and when she was examined late in pregnancy hydramnios and a baby with a very small head were recognised. I informed the midwife that I feared another anencephalic monster was present; however, she brought forth twins, of which one was anencephalic and the other normal. I think she never quite decided whether to be grateful for the one normal baby or to reproach me for not having given sufficient medicine to make both babies normal!

DIFFICULT LABOUR.

Another group of cases report difficult labours, usually forceps, and sometimes craniotomies. Careful examination of the pelvis shows it to be of normal size, and no history of oversized babies is forthcoming. An isolated forceps delivery is frequently only evidence of a time-saving device on the part of the doctor, but repetition, especially when required in midwives' cases, necessitates closer investigation. The patient is frequently over 30 or even 40 years of age, and her tissues are flabby, anæmic, and fat. She is constipated and flatulent, and her abdomen is inclined to be pendulous; the uterine wall is lax, and, masked to a certain extent by the fat abdominal wall, allows easy palpation of the baby. The head can easily be pushed low in the pelvis. Prolonged manipulation of the uterine wall rarely stimulates contraction. The condition of inertia affects all her muscular system, voluntary and involuntary, and is confirmed by the low blood pressure, which may be below 100 instead of about 120 m.m. of mercury. The diagnosis points out the obvious treatment. Calcium, best given as the freshly prepared lactate, and pituitary extract, say, 0·5 c.cm., given intramuscularly night and morning, by raising the muscle tone and increasing the excitability of the uterus, have proved successful in a number of cases.

Similar treatment has proved of value in cases with repeated post-partum hæmorrhage in past labours when the circumstances have indicated inertia as the cause. When the hæmorrhage has been due to an adherent placenta the outlook is less promising; one can only be prepared to interfere during the third stage before the blood loss is serious. I have found neither medical treatment during pregnancy nor curetting, in the few cases where I have known it tried, to be of any value. Moreover, there is no reason to expect a more healthy endometrium to be regenerated from the fragments remaining after a curetting than from the decidual remains after labour. Further, I know of no evidence that the lesion is in the endometrium—the fault may quite possibly be in the chorion.

SYPHILIS IN PREGNANCY.

The incidence and diagnosis of latent syphilis is an interesting problem in pregnancy. Active syphilis is a reasonably straightforward affair as regards diagnosis, at all events, but one has so little to work on in latent syphilis. There is pretty general agreement that reliable evidence of syphilis can only be demonstrated in about 16 per cent. of stillbirths—the figure certainly is under 20 per cent. Obviously four out of five stillbirths are not syphilitic, and there is no justification for considering previous stillbirths to be evidence of syphilis. Abortions are even more confusing owing to the great difficulty, or even impossibility, of finding the spirochæte in known syphilitic cases. It has been suggested that this is due to the action of placental ferments on the spirochætes causing these to break up into biologically inactive granules which, on the removal of the influence of the ferments, develop into spirochætes again. The two objections I have to this view are: (1) That as this would imply the triumph of the resisting forces over the invader, what kills the ovum? (2) The ovum having been killed, and the placental ferments being at least a steadily diminishing quantity, why do the granules never blossom forth into spirochætes? A pathological report on a previous stillbirth, if positive, of course settles the question; a negative report is not quite so certain. One of my cases illustrates a difficult point. A patient came under treatment after an abortion and a still-birth. The Wassermann reaction (W.R.) was negative; she was treated by an iron tonic and had a healthy baby. The treatment was resumed in her next pregnancy, and she had, about term, a macerated stillbirth in which were found spirochætes. The most careful investigation revealed no support for recent infection, and I am still in doubt as to the sequence of events in this case.

The classical history of repeated abortions, premature and then full-term stillbirths, nonmacerated

stillbirths, and neo-natal deaths is, in my experience, very rare. In a series of about 100 cases of latent syphilis which I investigated closely, I found the greatest variations in the history. Comparing syphilitic and non-syphilitic cases, the most suspicious feature—when it was present and nephritis could be excluded—was the repetition of premature stillbirths. This is not very satisfactory, and after all which of us is satisfied to await this or the classical sequence?

As a further guide we have the W.R. I believe it to be, generally speaking, reasonably reliable (rather heavily qualified, I am afraid). One has had the W.R. reported negative during a pregnancy which terminated in a syphilitic stillbirth, and—even more unpleasant from my point of view—two cases where the blood was reported positive were sent to a venereal clinic for treatment; the blood was again examined, and this time reported negative and the patients told there was nothing abnormal to be found. The remainder of the tale can be left to the imagination.

Having arrived at a diagnosis of syphilis in any given case, the questions of treatment and prognosis arise. In women who are first seen during pregnancy, I think the prognosis depends chiefly on the degree of infection and damage already present in the ovum. One can scarcely hope, even approximately, to restore to normal a syphilitic liver or placenta. In women who became pregnant during antisyphilitic treatment I found the prognosis uniformly good. One had to deal with these women before the V.D. clinics were started; treatment by salvarsan and its improvements and substitutes was out of the question except in isolated cases, and mercury was the standby. Hydrarg. cum creta tablets, 1 gr. t.d.s., with the necessary attention to oral hygiene, proved uniformly successful, and eventually I discarded the grey oil, which was resented by many patients.

NON-SYPHILITIC ABORTIONS AND STILLBIRTHS.

The patients with repeated abortions and stillbirths without any evidence of syphilis present a very difficult problem. Probably about one-fifth or one-quarter are due to chronic nephritis, which may itself be anomalous, as the following case shows. A woman, aged something over 30, was a second wife; her husband had had a healthy family by his first wife. The patient aborted regularly in the sixth month, the abortion being preceded by the appearance of large quantities of albumin in the urine which, generally speaking, contained only a faint trace or none, particularly when I came across her first. In the later intervals the albumin did not disappear to the same extent and one came to the conclusion that she was a chronic nephritic; unfortunately, she became pregnant again and developed a fatal cerebral hæmorrhage. I was surprised at the extent to which the kidneys were affected. The best thing such patients can do is not to become pregnant.

After eliminating the syphilitic and nephritic patients with repeated abortions, &c., we are still faced with about three-fifths of these cases where no obvious lesion can be found. One of the drugs recommended is potassium chlorate, but I have not had much experience of it. I have generally prescribed iron in some form, the tinct. ferri perchlor. when gastric conditions permitted, or some of the milder preparations in other patients. When iron has failed I have usually found pot. chlorate also unsuccessful, and have sometimes found good results follow the administration of mercury, even where I was entirely satisfied that syphilis could be excluded. Latterly I have usually given iron and mercury in these cases. Naturally these patients tend to drift away after unsuccessful treatment; not many of them can be followed through three or more pregnancies, and one cannot always find out what treatment has been adopted by one's predecessors in the patient's life-cycle.

HYSTERICAL FITS,

WITH SOME REFERENCE TO THEIR TREATMENT.*

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FROM a psychological aspect it may be argued that the genesis of the neuroses, in whatever manner their manifestations may be expressed, is identical, and that therefore the separation of one particular group of symptoms from another, and the direction of attention to their treatment, is erroneous. This argument is logical enough, but in practice the suggestive factor is primarily associated with most, if not all forms of treatment, whether the suggestion is directed to a supposed cause of the disorder or, as in the method about to be described, to the removal of symptoms. Attention is here centred on that group of symptoms of the neuroses which is characterised by paroxysms or seizures and commonly termed the fits of hysteria.

The modern conception of the genesis of the neuroses, unlike the ancient supposition that hysteria was the outcome of wandering of the womb, cannot be repudiated in the light of anatomical facts. An example of this is to be found in that method of psychotherapeutic treatment of which the theory is, in brief, to ascertain the genesis of the neurotic symptoms, supposedly to be found in repressed desires too painful to be remembered—to release the repressed desire, then to allow it to become attached to the idea of the physician, and finally to release the energy expressed in the repressed desire and transfer it to a socially useful aim. It is claimed for this method, however, that proper technique does not admit of any suggestive factor. If this is true, the high degree of technical skill essential to carry out the treatment must confine the performance of such a process to those only who possess unusual advantages. Again, disastrous results, which are not uncommon, are attributed to defective technique; practical training is therefore rendered too dangerous to be undertaken. Moreover, the process of treatment occupies a long time and much patience is requisite in seeing the same individual day after day for years. Further, the penalty, expressed in distasteful memories, of symbolic interpretation involved in the reading of Freudian literature will tend to inhibit some from a further study of a subject which so closely simulates a pathological sexual curiosity. Finally, ignorance of the subject may persist and be the outcome of domestic cowardice revealed in a substitution of the flames for the bookshelf.

It may be safely stated that at present most patients suffering from paroxysms of the neuroses are treated during the paroxysm by the infliction of pain—supra-orbital pressure, strong faradism, &c.—but methods employed in treatment of seizures are of little value in prevention of a recurrence. The benefits of physic dispensed to combat the recurrence of hysterical fits lie, in all probability, in the suggestive factor arising from the administration of drugs. It would be difficult to discover a less burdensome aid to suggestion. The results of such treatment are in the possession of the experience of most physicians and need not be further discussed.

Clinical Observations.

The method that I have adopted to prevent recurrences of the fits of hysteria is based on the following clinical observations: (*a*) During a paroxysm the patient reacts to external stimuli. (*b*) A patient suffering from the disorder can be made to reproduce a seizure to order by a simple method. (*c*) The seizure thus produced corresponds in every apparent detail

* Read before the Section of Neurology, Royal Society of Medicine, June 14th, 1923.

to the patient's previous attacks. (*d*) One type of seizure is constant in the individual and there is no change from one type into another. (*e*) During the paroxysm reproduced to order the patient can be made to realise that consciousness is retained from the beginning to the end of the seizure. (*f*) The patient, after realising that there is no loss of consciousness in the seizure, often becomes a good subject in whom the power of restraint or inhibition can be re-educated. (*g*) After a short course of re-education frequently no further attacks occur. (*h*) There are definite types of seizures which render classification possible.

During a hysterical attack a patient reacts to external stimuli—for example, the convulsion will subside on the infliction of pain if the latter is severe enough. Again, the attack becomes aggravated on the application of passive restraint, indeed, it would appear that the severity of an attack varies conversely with the degree of force exerted in attempting to hold the patient down. Such reaction to external stimuli would suggest that the degree of loss of sensibility is not deep during a seizure. The depth of insensibility would appear, from observation, to vary with the type of seizure rather than with the severity of the attack; the strongest stimuli being needed to rouse patients in whom tonic-like fits occur. Increase in the violence of the seizure on restraint would indicate that a seizure can be demonstrated to order, and this indication is strengthened by the occurrence of an attack when the patient is sufficiently urged to demonstrate a seizure.

In order to bring on a paroxysm in a patient subject to hysterical fits, considerable persuasion is sometimes needed and patients vary markedly in their willingness to produce an attack to order. Usually, at first, the patients will assert that it is impossible for them to demonstrate an attack in view of a lack of knowledge of its nature; however, persistence in urging the patient will result in feeble attempts being made by him to describe in words the nature of the attack. In cases where much difficulty is experienced in persuading the patient, methods may be employed to assist him to demonstrate the attack. For example, while standing he is commanded to close his eyes tightly and to make his body tense; while he lies on his back on a couch, he is ordered to raise his legs against the demonstrator's hands, which are placed on the patient's ankles. In the majority of cases an attack is readily reproduced by the latter method, but in some cases constant persuasion accompanied by determination is needed. It is, of course, essential to secure the patient's confidence, otherwise he may think he is being ridiculed.

Attacks thus produced resemble in every apparent detail the patient's previous attacks. This conclusion is arrived at by observing the seizure while the patient is waiting his turn for attention in the out-patient department of the hospital where seizures are not uncommon, particularly on the first visit, and afterwards persuading the patient to demonstrate a seizure to order. Again, friends of the patient who have observed previous seizures in the individual render further confirmatory evidence. Moreover, the patient will admit the similarity of the seizures after he has demonstrated an attack to order.

Although seizures vary in their character in different individuals, they always assume the same type in the particular individual, and there is no change from one type of seizure to another type. However, the severity of an attack in a given subject is rarely constant, and often mild attacks alternate with strong ones.

During a paroxysm produced to order the patient is constantly spoken to, and instructed to direct his attention to the general nature of the attack until it has subsided, after which he is asked to describe in words the various movements that were performed in the seizure. If his description appears to be hazy, the patient is again urged to reproduce an attack, which must be repeated until he has in general an intelligent conception of the nature of the movements. The patient is next asked to describe in detail by words the exact nature of the initial movements; if he cannot, an attack is repeatedly produced until he is able to do this. Finally his attention is directed to, and he is asked to describe the symptoms that preceded the initial movements. Some, on realising that they are conscious during a seizure, and that they have formed a clear idea of the nature of the attack from beginning to end, have no further seizures. But the majority of patients require a period of time during which re-education in their powers of inhibition must be undertaken. In order to accomplish this, my method is first of all to instruct the patient to lie on a couch and urge him to have an attack, during which time he is instructed to raise the lower limbs against the resistance of my hands placed on his ankles. After the attack has subsided he is ordered again to go through the same movements, but this time he is urged to relax the body during his attempts to raise the limbs and to inhibit the tendency to make the body rigid. It will be observed that although the patient is attempting to carry out the movement, the limbs are rigid and raised only a few inches from the couch in spite of the fact that pressure exerted on the ankles is so slight that the performance of the movement could not possibly be interfered with passively. It is advisable to persist with the patient until he is able to raise the legs at right angles to the trunk. When this is accomplished the muscles of the limbs are no longer rigid, and the patient becomes normally relaxed; the face no longer bears the expression of great strain, and there is reasonable ground to anticipate that the patient will successfully inhibit subsequent tendencies to seizures. The result is not always satisfactory, and if the previous methods have failed it is necessary to attempt to break down the resistance of the patient by inducing attacks frequently. For example, if he is subject to three or four attacks a day, attacks to order must be brought on in excess of that number and diminished from day to day and, if necessary, from week to week, depending upon whether or not there is a return of the paroxysm in the interval. It will be found that the patient will soon resent this treatment in view of its exhausting nature, and this indicates still more strenuous efforts to conquer the patient by producing even a greater number of attacks and so create in him an atmosphere of aversion to the attacks. The process, if successful, is usually not a long one, and the resistance of the patient breaks down after the second or third time. This method of treatment should not be undertaken in types 3, 6, and 7.

Types of Seizures.

Seizures which are the outcome of the neuroses present many types, and I have observed the following principal types: (1) An apparent momentary loss of consciousness, a faint; (2) a state of apparent coma lasting for hours, in which the pulse and respiration rates are normal; (3) a pseudo-tonic convulsion; (4) a pseudo-clonic convulsion; (5) a convulsion beginning in a pseudo-tonic contraction, followed by a pseudo-clonic contraction; (6) hystero-epilepsy; (7) attacks of uncontrollable laughing or crying in which the patient passes large quantities of urine; (8) other violent movements expressed in attempts to injure himself or those who attempt to restrain the patient by holding him down; (9) attacks of staggering. Paroxysms of the neuroses are not uncommon in epileptics.

Illustrative Cases.

Type 1.—An apparent momentary loss of consciousness is not uncommon in neurasthenic women whose symptoms are in the most part subjective. These patients complain of vertigo or fainting, in which they recognise their surroundings, but are unable to speak during the attack. Other conditions which cause vertigo and fainting must, of course, be eliminated before a diagnosis of hysteria is made. From the history of some of these patients petit mal may be suspected, and in the absence of witnessing an attack such a diagnosis is not infrequently made. The demonstration of the attack to order always confirms the diagnosis.

A woman of 45 years, the wife of a hairdresser, who resented the imputation that her husband was a barber, complained of "neurasthenia." She did not volunteer information regarding the occurrence of attacks, and when asked directly if she ever fainted at first affirmed that she did not have hysteria and was annoyed. Soon, however, she admitted having attacks in which she "lost" herself for a moment, always in the presence of her husband. After the threat that she would leave the hospital and return to her home rather than submit to the indignity of demonstrating a seizure her confidence was ultimately gained and she was at length persuaded to demonstrate the attack, in which she became rigid, clutched her right forearm with her left hand and threw her head over the back of the chair on which she was sitting and began to respire noisily. The face became slightly cyanosed and her eyes were closed. The attack lasted about 15 seconds. Through failure on the part of an inexperienced nurse to inhibit a laugh, the patient rose quickly to her feet, left the room indignantly, and has not since returned to the hospital.

This illustrates that care must be taken to gain and remain in the confidence of the patient, and the unfortunate results that ensue if hysterical manifestations are not treated with respect.

Type 2.—The simulation of coma as the outcome of the neuroses is, in my experience, not common in hospital practice. It may be argued that when patients assume a state of coma they should not be considered as hysterical, but it must be admitted that the patient at such a time is not normal mentally. The condition often occurs in young women who are unaccustomed to the ordinary knocks of life. They are usually irritable.

A young woman of 22 years was to be married in a week's time. One night, just after dinner, her mother effected an entrance into the consciousness of the patient's fiancé; in consequence of which the mind of the latter was impervious for a moment to a question asked by the patient, who, feeling slighted, retired from the room, to be further submitted to the indignity of a lack of recognition of her absence for nearly an hour. She was found on her bed fully dressed and could not be roused. It was reported that she was pulseless but breathed slightly, and the diagnosis transmitted over the telephone was cerebral hæmorrhage. On examining the patient in the presence of relatives she would not reply to any questions asked her, and no effort was made to rouse her by force. After the relatives had left the room she suddenly asked angrily, "Who asked you to come here?" The patient's confidence was soon obtained, and she related the above-mentioned incident with much emotion. The patient has since become the mother of a healthy child and there has been no repetition of the attacks.

In such cases it is advisable not to acquaint the relatives with the nature of the disturbance.

Type 3.—A tonic-like contraction of the whole body, the history of which simulates the tonic stage of an epileptic seizure, resembles clinically the first part of a hystero-epileptic seizure, but does not progress further than a slight tilting forwards of the pelvis. The heels and occiput are pressed firmly against the couch, the body is rigid, and the pelvis is raised from the surface of the couch. The face is flushed, the eyes closed tightly, and there is an expression of severe distress. During this pseudo-tonic state the breath is held. After half a minute to a minute the head turns either to the right or to the left and the muscles of the body suddenly relax. The respirations then become very rapid and the patient either cries or laughs.

A chorus girl, aged 21, fell from some badly constructed steps on the stage at a rehearsal and injured the back of her head and had a seizure. There was no scar or other evidence of injury. She was unable the next day to take her part in the performance in view of another attack which, when demonstrated to order, proved to be of the type described here. For two months the attacks occurred on an average of twice a week, and for a week previous to my seeing her an attack occurred every day. Considerable persuasion was needed in this case to produce an attack to order. Eventually an attack was induced, after the patient was instructed to raise the limbs against passive resistance applied to the ankles. The patient's sister witnessed this attack as she had other previous seizures and confirmed that it was similar in every detail to the other attacks. During the seizure the patient was spoken to and replied to questions asked her with considerable effort. When the attack had subsided she was questioned as to whether she was of the opinion that further attacks could be prevented with her own effort, and she replied in the affirmative, affirming that she did not recognise before that she was conscious during the attacks. She returned to her work in the chorus in a week's time, and did not fail to attend either rehearsals or performances. A month later on seeing the patient she said that there had been no return of the attacks. Two months later a seizure occurred in bed, and she volunteered the information that it was difficult for her to restrain the seizure during the menstrual periods; she deliberately had an attack, which she said she could have inhibited, but chose a time when it did not interfere with her work. She further stated that she was of the opinion that if she married it would not be necessary for her to have an attack, and asked advice regarding that matter. The patient has been married for nearly two years and there has been no recurrence of the seizures.

This particular case is chosen for illustration here because it can be regarded as favourable to psycho-analytical speculation; it may be asked what treatment is to be employed in cases where lack of opportunity renders marriage impossible? When the patient realises that the condition resolves itself into one of conscious choice, it would appear that there is no treatment except that which pertains to the practice of restraint on the part of the patient. These patients return to their duties, and although attacks sometimes occur in secret, their productive capacity is not interfered with and they become useful citizens.

Type 4.—Clonic-like fits are more common in men, and were in my experience the only type of hysterical seizure that occurred in soldiers in the recent war. A localised tremor is usually present, either in the fingers or the tongue, or there may be a blepharospasm. The attack, as a rule, comes on with some excitement or sudden shock, and often the banging of a door is sufficient to bring on a seizure. The tremor, which at first may be fine, becomes coarse, soon spreading all over the body; the patient falls down in a coarse generalised tremor and appears to be unconscious. As a rule he does not become violent unless he is passively restrained, when the convulsions become greatly aggravated.

A sawyer, aged 24, was unable to work for five years on account of seizures which began during an air raid in 1916, and one or more attacks occurred almost every day. There was a history in this case of mutism, which persisted for six months after the first seizure, to be followed by stammering. A partial right hemianæsthesia was made out. The patient responded to the suggestion to demonstrate an attack without much persuasion. This attack when fully matured consisted of violent clonic-like movements of voluntary muscles including the face, neck, trunk, and limbs. During the first attack demonstrated to order the patient did not respond to questions asked him, and after it had subsided he was unable to describe its nature. During the second attack produced to order the patient replied to questions during the first part of the attack, but when the movements became violent he did not answer questions put to him. When he was seen a week later he had had no attacks in the interval but complained of severe fatigue, the outcome of attacks produced during his former visit. He protested against further attacks being produced, but eventually submitted; in the next attack to order he was able to respond to questions asked him throughout, and was afterwards able to describe in detail the nature of the attacks. The following week, during an attack produced to order, he was instructed to relax himself as soon as the tremor became generalised by allowing his arms to fall loosely at his sides. A year after this treatment the patient had had no recurrence of the seizures, and he had been employed for nearly that length of time in a remunerative position. Sometimes, he said, he had a feeling of an attack impending, but by relaxing himself he was always able to prevent it.

It should be stated that this patient was of fairly average intelligence, in which case a good result is to be expected.

Type 5.—Seizures beginning in tonic-like contractions and followed by clonic-like contractions are not uncommon in men, and this type is most frequently mistaken for epilepsy. The patient suddenly becomes rigid when standing, his trunk is erect, and his head thrown back; he staggers backwards or sideways and finally falls, shaking all over. He may or may not injure himself when he falls. This type resembles in

many details the one just described, but differs from it in an absence of the initial tremor and in the presence of a definite initial rigid state.

A grocer's assistant, aged 55, lost his wife, who died suddenly from heart failure. On hearing the news he collapsed and was thereafter subject to seizures, which, according to his local doctor's description, appeared to be correctly diagnosed as epilepsy. The attacks occurred on an average of once a day. When the patient was asked to describe in words the nature of the attack his eyeballs suddenly rolled upwards, his head was thrown back, and he remained rigid for about ten seconds. Then he began to stagger backwards and to shake all over and fell, bruising his right forearm. A nurse in attendance tried to prevent him from falling and on my instructions attempted to hold him down after he had fallen. With this restraint the violence of the shaking became aggravated. The attack began to subside with the removal of the restraint. With renewed passive restraint the movements again became violent, so that with repeated application of restraint the condition simulated status epilepticus, but it differed from the latter in the absence of a repetition of the rigid stage. When the restraint was removed altogether and the patient left to himself the paroxysm ceased and when he was instructed to rise to his feet he did so with difficulty and staggered. When seen next time the patient was urged to produce another seizure and with some persuasion he succeeded in demonstrating an attack which was in all respects similar to the preceding one. Again he fell and injured his right forearm. After the attack had subsided he was urged to demonstrate another seizure and resented the suggestion because of the pain in his right forearm; he submitted, however, but this time, when he fell he did not injure himself. On this occasion four attacks were induced and afterwards he was instructed to return in a week's time and informed that more attacks would be brought on if in the interval there was a recurrence. When he returned a week later, in spite of the fact of no attacks in the interval, two attacks were induced much to the patient's distress. The following week one attack was brought on, although there had not been a repetition of the seizures. The result was completely satisfactory. He was treated over a period of six weeks and there has been no recurrence of attacks.

Type 6.—Hystero-epilepsy or grande hysterie, as described in detail by Charcot and Richer, is not common in this country, and my experience of this type of hysteria is confined to four cases, only one of which was treated by the methods described here. The patients were all women. In view of the spectacular nature of the attack and the common idea that the state is partly epileptic, a record of observations made in one of the cases will be given. The attack was induced in the patient and witnessed by three colleagues.

An unmarried woman, aged 26, first associated herself with these attacks at the age of 18. The attacks occurred twice a week on an average. Of their nature, the patient claimed to be entirely ignorant, and she was therefore unable to give a description of them. She was on one occasion incontinent during an attack when it occurred in bed, and her tongue was sore after the attack. The patient was sent into a dressing room with the order to place herself on a couch there and to demonstrate the attack. The order was at first resented, but she was eventually persuaded, after a complaint that the couch was too narrow for the performance! The attack began by the patient throwing herself into a marked degree of generalised tension as if she were attempting to increase her stature by an apparent stretching of her neck and forcible plantar flexion of the feet, so that their plantar surfaces almost, but not quite, approximated to the surface of the couch, the legs being drawn tightly together. The arms were drawn close to the sides of the body, and they also appeared to be lengthened by over-extension of the wrists and fingers, the forearms being at the same time markedly pronated, so that the dorsal surfaces of the thumbs approximated to the surface of the couch. The eyes turned upward, the sclerae only being exposed; the face, almost from the beginning, became distorted in grimaces, and the cheeks and lips were firmly pressed against the gums and teeth. The patient's explanation of the movements of the face, at this stage, was to the effect that such contortions assisted in the production of saliva. Slowly the pelvis was raised from the surface of the couch with the assistance of her thumbs, and at the same time the head was gradually thrown backward. The soles of the feet now became approximated to the surface of the couch and were firmly pressed against it. The arms began to draw away from the sides of the body. Slowly the head retracted until the forehead rested on the surface of the couch. This was accomplished by the patient tilting the pelvis more and more ventral by drawing the feet under the trunk towards the head until finally the forehead and the heels became about approximated. The face was by this time intensely cyanosed, and the front of the neck appeared markedly swollen, the cyanosis being due to partial suffocation in view of the position of the head. Respirations became quickened and the patient could be seen to protrude blood-stained foam between her teeth by forcibly pressing the tongue against them. The arms assumed a position at right angles with the trunk and athetoid-like movements appeared in the fingers. The explanation given by the patient of the position of the arms was to the effect that it helped her to balance. When the arms were forcibly moved in all directions they appeared to be wax-like, and the patient's equilibrium was not upset in these movements. The arched body was extremely tense and supported without difficulty strong pressure on the abdomen. In this state of arc de cercle the patient answered questions asked her by others in the room, but to the question, "You do not know what I am saying?" asked by a colleague, who at this stage came in, she did not reply. The patient remained in this position for ten minutes, and clonic-like movements occurred for a few seconds as the body tilted over to the right side; gradual relaxation from superextension slowly took place, until the patient once more assumed a relaxed dorsal position. The plantar surfaces of the feet on the couch together with the forehead, during the severe state of opisthotonus, formed a tripod, and seemed to be sufficient to support the body in that position. With complete relaxation there was extreme fatigue. In the course of this attack there was no appearance of the third and fourth stages as described by Charcot, in which dramas are enacted and a period of delirium occurs. The treatment of the seizure consisted in demonstrating to the patient that she was not, as she supposed, unconscious during the attack, but rather, fully alive to every detail. When the patient returned in a fortnight she reported the occurrence of one paroxysm when she was in bed. On being told that the attack could be controlled the same as walking could be controlled, she admitted that the attack had been deliberately induced by her because it produced a "pleasant sensation." By degrees she chose to inhibit the impulse to produce the sensation, but not altogether.

The attacks have been reduced in the last two years from several a week to about the same number a year, and the paroxysms occur now when she is alone and they do not interfere with her duties.

Type 7.—Paroxysms of uncontrollable laughing or crying in which large quantities of urine are passed in my experience only occur in women who practise uncleanliness with themselves. Attempts to induce an attack in these cases are, of course, to be avoided. Such patients are benefited by hard manual labour on farms.

Type 8.—Seizures which may be described as violent movements in which the patients tear at their clothing, attempt to injure those who make an effort to restrain them, and in the event of nobody attempting to do so, will pull at their own hair and injure themselves by scratching or biting their arms, are not uncommon in both sexes, but are much more frequent in females. The movements are very grotesque, and the patients in their agitation will expose themselves, shout, and call out for a friend. The condition is sometimes difficult to diagnose from manic depressive insanity at first sight. The seizure in no way resembles epilepsy.

A woman, 30 years of age, suffered from this type of attack for a year, and seizures occurred on an average of three times a week. The first paroxysm began after she was told that she had contracted syphilis from her husband and while waiting for an intravenous injection of novarsenobillon. The attack was very violent, and she was held down by fellow patients in the out-patient waiting-room. A week later, when she was urged to demonstrate an attack, she began it by turning her trunk and head violently from left to right. She threw out her arms and called for her mother, and knocked her head against the floor. The hair soon became dishevelled, and she began to tear at her clothing, shouting louder and louder. She was firmly ordered to rise to her feet, which she did, and complained that her arm was numbed. She made a promise to control these attacks, and there has been no recurrence for six months.

Type 9.—Attacks of staggering, which, according to the subjective evidence gained from the patient,

would suggest petit mal, are often preceded by globus, palpitations, or disagreeable sensations in the abdomen. The attack may occur in the absence of these symptoms or one or all of them may be present.

A joiner, aged 48 years, came over giddy when working on a building in a safe part and lost his "senses" but did not fall. There were no signs of organic disease, and other causes of vertigo were eliminated before arriving at a diagnosis. When he was asked to demonstrate an attack he said he became giddy and lost himself completely, but could not demonstrate the nature of the attack. After much persuasion and after he had paced up and down the room in his attempt to produce an attack for several minutes, he suddenly began to stagger sideways and to the right, reaching out his right hand for the purpose of supporting himself at a table. The patient said he was giddy, and that the attack which had just occurred was not the outcome of efforts to demonstrate the attack. He was at once ordered to produce another seizure, a suggestion to which he almost immediately responded. The attacks were repeated several times, and he was finally convinced that he was completely conscious during the attacks, and that it was in his power to bring on an attack at any time as it was under the control of his will. This resulted in a subsidence of the attacks for eight months; since that time there is no note made of his case.

Epileptics may be subjects of paroxysms of the neuroses. A hysterical attack may immediately follow an epileptic seizure, or the former may bear no relation to the latter as far as its occurrence in time is concerned. Again, the occurrence of petit mal, grand mal, and paroxysms of the neuroses are not uncommon in the same individual. The conditions must be treated separately. These patients should be given luminal, one and a half grains, three times a day in addition to the treatment for the hysterical condition.

Conclusion.

A diagnosis between hysterical fits and epilepsy is rendered difficult and sometimes impossible if no seizure is witnessed. Babinski and Froment were able to reproduce a hysterical fit in a subject by suggestion aided by electricity. Electricity is certainly not needed to reproduce a hysterical fit, and it is doubtful if extraneous suggestion is needed. I have frequently seen hysterical fits reproduced while the patient has attempted to raise the lower limbs against passive resistance, no order being given and no comment made other than "raise the lower limbs." I have the permission of an officer who was on duty at the recent Trooping of the Colours to state that 5 per cent. of the rank and file, after standing in a rigid state of attention, fell out in a fit in the course of the first ten minutes of the performance. An attack seems always to follow a certain state of tone of the muscles, which is created by simultaneous contraction of agonists and antagonists. Clonic-like movements occur in many neurasthenic individuals subjected to the same test, and in them there is the same distressed facial expression. No wholesome effort is made to overcome the passive resistance as in the healthy individual, who usually either succeeds or in his attempt to do so sits upright. This test is, I believe, of considerable diagnostic value, and may be as easy or as difficult to elicit as a plantar reflex.

The treatment which has been considered in these cases resolves itself into the removal of symptoms, and in the selection of 100 cases for the purpose of determining results, an equal number of each type of paroxysm has been chosen as far as that has been possible. The record has been brought up to a recent date, and the period of freedom from the attacks varied from five years to six months. The percentage of recoveries from attacks is about 60. Types 3, 6, and 7 materially diminished the number of apparent "cures," but in them improvement was observed in the marked reduction in the number of seizures and in the fact that the attacks occurred when the patients were alone.

Two of the reported cases were patients at Queen-square, and I have to thank Dr. Gordon Holmes and Dr. Hinds Howell for permission to publish them.

THE ANTICOAGULATING ACTION OF THE ARSENOBENZOLS ON BLOOD.

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Flandin and Tzanck have described in THE LANCET [1] the anticoagulating action of the arsenobenzols on blood. They state that (1) the coagulation time of blood from an individual who has received an intravenous injection of arsenobenzol may extend from 30 minutes to 24 hours or longer, and (2) the state of incoagulability, as shown by repeated samples of blood, may continue for a period varying from several hours to several days. The authors deduce from their observations the necessity for considering whether a patient is under treatment with arsenobenzol before submitting to surgical procedures. They also suggest that arsenobenzol is superior to citrate as an anticoagulant for blood, since small quantities of it do not modify the volume or quality of the constituent elements of blood. They do not discuss the mechanism by which arsenobenzol acts as an anticoagulant, except to state that the corpuscles and platelets are not modified in form or number and are not agglutinated. In view of the extensive therapeutic use of the arsenobenzols we have determined in detail the anticoagulating action of this type of compound on blood. We find that the addition of one part of arsenobenzol to a thousand parts of blood prevents the coagulation of blood in vitro; that a similar quantity injected intravenously into rabbits prevents coagulation for a brief period of time (less than one hour) after which normal coagulability returns; and that therapeutic doses, used in clinical cases, have practically no effect on blood coagulation except to a small degree after long courses of administration.

In the following description we consider the anticoagulating action of the arsenobenzols when (*a*) added to blood in vitro, (*b*) injected intravenously into rabbits, and (*c*) used in therapeutic quantities on man.

(*a*) *Experiments in Vitro.*

The coagulation of blood in vitro is prevented by the addition to it of 0·1 per cent. arsenobenzol. This anticoagulant action of arsenobenzol is exerted entirely on the last phase in blood coagulation—that is, on the action of thrombase on fibrinogen whereby the formation of fibrin is prevented or delayed. The following experimental results (Table I.) show this inhibitory action of neosalvarsan on the coagulation of oxalated plasma by thrombase (fibrin ferment).

TABLE I.

Oxalated plasma.	Neosalvarsan 1 per cent.	Thrombase.	Coagulation time.
2 c.cm.	0 c.cm.	0·6 c.cm.	4 mins.
"	0·1 "	"	11 "
"	0·2 "	"	16 "
"	0·3 "	"	50 "

Table I. shows that the time of coagulation of plasma by thrombase was extended from 4 to 50 minutes by the addition of 0·1 per cent. neosalvarsan.

The following experiments show that the enzyme thrombase is not affected by neosalvarsan. A solution of thrombase was incubated with varying quantities of neosalvarsan for 30 minutes, and the coagulating activities of the resulting solutions were then determined (Table II.).

During the incubation period of 30 minutes the neosalvarsan had full opportunity to destroy the thrombase. The coagulating activities of the mixtures

[1] French Supplement, 1922, ii., 1177.

when tested on oxalate plasma showed that no destruction had taken place (Table III.).

TABLE II.

Thrombase.	Neosalvarsan 1 per cent.	—
1 c.cm.	0·3 c.cm.	(X)
"	0·2 "	(Y)
"	0·1 "	(Z)

TABLE III.

Oxalated plasma.	—	Coagulation time.
2 c.cm.	0·6 c.cm. (X)	6½ mins.
"	" (Y)	4½ "
"	" (Z)	4 "

The slightly increased time of coagulation with (X) and (Y) compared with (Z) was due to the additional quantities of neosalvarsan contained in these fluids.

It is evident that neosalvarsan does not destroy thrombase. Therefore the inhibitory effect of this compound on blood coagulation must be intimately associated with its action on fibrinogen. Probably the neosalvarsan unites directly with the fibrinogen, and the complex thus formed is less readily coagulated by thrombase. This hypothesis is supported by the fact that all arsenobenzols do not affect the coagulability of the blood. Thus, neosalvarsan (German), sulfarsenol, and novarsenobillon are equally effective in preventing blood coagulation, but stabilarsan has no such anticoagulant action. Stabilarsan is a glucose compound of arsenobenzol. It is probable, therefore, that that portion of the arsenobenzol group which combines with glucose is also responsible for the combination of the arsenobenzol with fibrinogen. In this connexion it is of interest to observe that inorganic compounds of arsenic do not affect the coagulation of blood. Consequently the combination of the arsenic with the fibrinogen must be due to the particular grouping which is common to the arsenobenzols and which can combine with glucose as readily as with fibrinogen. The fact illustrates the rôle of the subsidiary groupings in determining the physiological action of any compound.

(*b*) *Experiments in Vivo.*

The anticoagulant action of the arsenobenzols when injected intravenously into animals is of the same order as that observed in test tube experiments. Thus the intravenous injection of neosalvarsan, sulfarsenol, or novarsenobillon into animals to the extent of 1 part per 1000 parts of blood immediately delays or prevents the coagulation of the blood, whilst a similar injection of stabilarsan has no effect on its coagulability. But, whereas Flandin and Tzanck describe the anticoagulant action as persisting for periods of time varying from several hours to several days, we find the effect extremely transitory. The results we obtained are illustrated in the following xperiments:—

Rabbit 1.—1 cm. neosalvarsan (10 per cent.) was injected into the marginal vein of the ear = 0·1 per cent. in the blood. Samples of blood were taken from the ear vein after varying periods of time (Table IV.).

TABLE IV.

Sample of blood.	Coagulation time.
Before injection	2 mins.
10 mins. after injection	No coagulation in 24 hours.
60 " " "	2 mins.

Other experiments showed that the normal coagulation time was restored within 30 to 45 minutes after the intravenous injection of the neosalvarsan.

Rabbit 2.—3 c.cm. of neosalvarsan (10 per cent.) into the marginal vein of the ear = 0·3 per cent. in the blood. As before, samples of blood were taken from the ear vein after varying intervals of time (Table V.).

TABLE V.

Sample of blood.	Coagulation time.
Before injection	3 mins.
10 mins. after injection	No coagulation.
45 " " "	"
60 " " "	"
90 " " "	2 mins.

Thus the coagulability of the blood returned in 90 minutes, although the amount injected would correspond to an intravenous injection of 10 g. into a normal man. With the return of coagulation an increased coagulability (positive phase) is often observed, indicating some reaction of the organism against the anticoagulant circulating in the blood.

Experiments were made to determine whether the arsenobenzols readily produced cumulative effects on the coagulability of the blood. The following result illustrates this type of experiment:—

Rabbit 3.—2 c.cm. neosalvarsan (10 per cent.) into the marginal vein of ear. Blood coagulation was inhibited for one hour, after which time normal coagulability returned. A second injection of 2 c.cm. of the neosalvarsan solution was now given. The blood became non-coagulable, but regained its coagulability in 75 minutes. A third intravenous injection of 2 c.cm. neosalvarsan (10 per cent.) was administered; 90 minutes after the third injection the coagulability of the blood became normal.

It is evident from experiments of this order that there is no marked tendency for the arsenobenzols to accumulate in the blood and thereby to produce cumulative effects comparable to the coagulation times described by Flandin and Tzanck.

Rabbit 4.—2 c.cm. stabilarsan (10 per cent.) into the marginal vein of ear. No effect on blood coagulation either immediately or half an hour later.

These observations indicate (1) that stabilarsan does not affect the coagulability of the blood in vivo, and (2) that the glucose is not split off from the salvarsan before absorption from the blood.

(*c*) *Clinical Observations.*

The preceding experimental work shows that the addition to blood of some of the arsenobenzols to the extent of 0·1 per cent. inhibits coagulation not only in vitro but also in living animals. But when the arsenobenzol is injected into animals the effect on the coagulability of the blood passes off extremely rapidly, probably owing to the absorption of the arsenobenzol by the tissues and its separation from the fibrinogen of the blood. The quantities of the arsenobenzols injected intravenously into the experimental animals were, however, considerable, compared with the therapeutic doses used for clinical cases. Thus, 1 c.cm. of a 10 per cent. solution of neosalvarsan injected into a rabbit corresponds with an injection of 3 g. into a man, a quantity greatly in excess of the usual maximum dose of 0·9 g. Corresponding with this fact we find that the intravenous injection of therapeutic doses of the various neosalvarsans has practically no effect on the coagulability of the blood of human beings, the maximum dose of 0·9 g. giving a concentration of only about 0·02 per cent. neosalvarsan in the blood.

The effects on the coagulability of the blood of the various organic arsenical compounds immediately after intravenous injection are illustrated by the following cases (Table VI.):—

TABLE VI.

	—	Coagulation time— Before injection.	10 mins. after injection.
A.	Neosalvarsan (German) 0.45 g	2 min. 10 sec.	2 min. 10 sec.
B.	" " "	2 " 25 "	2 " 45 "
C.	" " "	2 " 45 "	3 " 5 "
D.	" " "	3 " 0 "	3 " 25 "
E.	Sulfarsenol 0·6 g.	3 " 40 "	3 " 10 "
F.	Stabilarsan "	2 " 30 "	2 " 20 "
G.	" "	3 " 30 "	3 " 40 "
H.	" "	2 " 10 "	2 " 10 "

It is evident from the above figures that the intravenous injection of therapeutic quantities of the

various arsenobenzol compounds has practically no effect on the coagulability of the blood. Thus the coagulation figures for stabilarsan (which does not effect the coagulability of blood) before and after injection do not differ in any marked degree from those given by neosalvarsan and sulfarsenol, both of which entirely prevent blood coagulation in vitro. Again, in some cases (F and E) the coagulability is slightly increased; in other cases (B, C, D, G) there is a small delay; and in the remainder (A and H) there is no change.

The effect of repeated injections of the arsenobenzols on the coagulability of the blood was determined. Although experiments on rabbits for short periods of time gave no indication of any cumulative effects of these compounds on the blood, yet it appeared possible that such effects might arise in human beings, especially in cases of long-continued administration. The following coagulation times were obtained before and after an intravenous injection of arsenobenzol in cases which had undergone prolonged treatment (Table VII.).

TABLE VII.

—	Coagulation time—	
	Before injection.	10 mins. after injection.
K. 6 previous injections of neosalvarsan	2 min. 45 sec.	3 min. 5 sec.
L. 13 previous injections of neosalvarsan	3 „ 0 „	3 „ 25 „
M. 20 previous injections of novarsenobillon	2 „ 25 „	2 „ 45 „
N. 50 previous injections of various arsenobenzols ..	2 „ 20 „	3 „ 30 „

Except in Case N the results offer no evidence that the arsenobenzols accumulate in the blood and inhibit its coagulability even after an extensive series of intravenous injections. Even in Case M the delayed coagulability is small and does not bring the coagulation time outside the normal limits.

Summary.

As a result of our investigations we find that some of the arsenobenzols (neosalvarsan, sulfarsenol, novarsenobillon), when added to blood to the extent of 0·1 per cent. prevent its coagulation. This inhibition is due to the action of the arsenobenzol on the fibrinogen, probably by direct combination with it. The combination of the arsenobenzol with fibrinogen depends upon the organic grouping, since arsenious oxide has no effect on the coagulability of the blood, nor does arsenobenzol combined with glucose (stabilarsan) alter blood coagulation. Arsenobenzol, 0·1 per cent., inhibits the coagulation of blood not only in vitro but also in vivo. But in the animal body the inhibition of coagulation passes off within an hour, probably owing to the passage of the arsenobenzol from the blood into the tissues. Therapeutic doses of the various salvarsan preparations intravenously injected into men or women have practically no effect on the coagulability of the blood, since these quantities fall far below the minimum amounts required to produce fluid blood. Further, the arsenobenzols do not appear to accumulate in the blood and thereby effect its coagulability, since even after prolonged courses of administration the coagulability of the blood remains normal. Hence, previous treatment with arsenobenzols, from the point of view of the blood coagulability, need not be seriously considered when surgical operations are in question.

We are indebted to Colonel L. W. Harrison for permission to determine the action of the arsenobenzols on the coagulability of the blood in clinical cases.

MARRIAGE, PREGNANCY, PARTURITION, AND TUBERCULOSIS.[1]

BY E. WARD, M.D. CAMB., F.R.C.S. ENG.,
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THE importance of the question as to whether a tuberculous woman should marry need not be laboured. To answer it we must know what are the risks, if she does marry, to herself, her children, and her husband. Search in the literature of the subject, extensive though it be, does not provide a sufficient answer. We find series of cases, leading to different conclusions; the results of tuberculin injections, contradicted by others, and statements by great men. The text-books again do not help us much. Osler writes: "Child-bearing increases the risks from tuberculosis *enormously*," and quotes Dubois as follows: "If a woman threatened with phthisis marries she may bear the first accouchement well, a second with difficulty, a third never." But opposite opinions are stated with equal emphasis. I have heard more than one experienced practitioner express the view that marriage and child-bearing always benefit tuberculous women. By investigation of the material which comes to my notice I have attempted to throw further light on this difficult problem, and am driven to conclude that, as often happens in controversies, both schools are right, and both are wrong. In many respects my conclusions agree with those published by Fishberg.[2] First let me cite two cases illustrating a type not infrequently seen.

A woman was under treatment at 26, during three years, at a public dispensary, for tuberculosis of the lungs: she then married and bore 10 children. Marriage improved her health, as also did the first childbirth; of the other confinements some have made her worse, some better, and by some she was unaffected. To-day (at 54) she remains much as when she married; not many physical signs in the chest, a little daily sputum, in which tubercle bacilli have recently twice been found. Of her children three died from tuberculosis, three are alive but tuberculous, two have died from unknown causes, two I would pass as negative.

A woman, now aged 47, was from 16 to 18 confined to her room because of pulmonary tuberculosis. She then gradually got about again, married at 24, and has been better since. Occasionally she was worse after parturition, at other times better, mainly unaffected. Of her 11 children, three are tuberculous, and have all been in sanatoriums; four are "suspect," one dead, three are alive, but as yet unexamined by me.

For nearly three years I have been trying to collect evidence of the risks of matrimony to tuberculous women; the work is not nearly complete, and is imperfect in many respects. Inquiries are afoot which may double the number now to be quoted, but I do not think the conclusions will be materially different. Nothing elaborate is aimed at; only to say roughly whether the patient is made better or worse, or left unaffected by marriage, pregnancy, parturition, or lactation. The condition of the children was also investigated. The information was obtained by personal observations in some cases, in others by questioning, cross-questioning, and re-questioning on different occasions: the answers being checked, where possible, by collateral inquiries from relatives, friends, or the practitioner in attendance. When in doubt it is safe to say "unaffected." Only major tuberculosis is considered. There are several difficulties, the chief being to decide if the deterioration in health is due to an exacerbation of tuberculosis or to some other cause. Of the latter the principal are vomiting in pregnancy and perineal or uterine injuries and displacements after parturition; by inquiry these can usually be differentiated from tuberculosis if their existence is borne in mind. The results of hæmorrhage are not so important, as the patients often recover rapidly; if not, this may itself lead to an exacerbation of the disease. There

[1] A paper read before the Tuberculosis Society.
[2] Fishberg: Pulmonary Tuberculosis, 1922.

are many tempting side tracks, but the main road will be followed, and for the sake of brevity and clearness the results are expressed in percentages.

Marriage.

The effect of marriage alone in 125 tuberculous women was: 60 per cent. unaffected, 26 per cent. better, 14 per cent. worse. Lately I have begun to include men, but only 23 have been investigated so far; of these 70 per cent. are unaffected, 26 per cent. better, 4 per cent. worse. Thus tuberculosis is unaffected or is improved by marriage in about 90 per cent. of tuberculous women.

Bearing in mind the fact that 15 to 20 per cent. of patients may be expected to deteriorate in any period of one or two years we must conclude that marriage has, if anything, a beneficial effect on tuberculosis.

Pregnancy.

Out of 423 pregnancies in 237 women, 53 per cent. had no effect, 16 per cent. improved the patients, 31 per cent. made them worse. The clinical *onset* of disease occurred during pregnancy in about 4 per cent. of women, and of these less than half terminated fatally. Some cases are remarkably improved by pregnancy, others go to pieces, but about 70 per cent. are better or unaffected. Unluckily it is impossible to consider pregnancy apart from parturition.

Parturition.

Out of 442 labours in 240 patients, 32 per cent. left the patient unaffected, 19 per cent. made her better, and 49 per cent. worse.

The onset of disease occurred after parturition in 17 per cent. of patients, of whom nearly one-half died. If we add the pregnancy onsets it gives us 21 per cent. Apart from these onset cases, which naturally attract notice, and have considerably influenced writers on the subject, only 2 per cent. of women died as the direct result of an exacerbation caused by child-bearing; so that parturition is likely to make pre-existing tuberculosis worse, but unlikely to make it fatally so. The worst are the onset cases, which cannot be foreseen. Yet there are instances (19 per cent.) where parturition has a beneficial influence, sometimes strikingly so. A patient with chronic phthisis, almost an invalid, may suddenly pick up after the first baby, and become the mother of a large family. Sometimes we find a patient better during pregnancy, worse after the confinement, less often the reverse; the patient goes downhill rapidly during pregnancy but picks up wonderfully afterwards, although she has to look after a child. We must not underrate the mental factor in these conditions. A study of resistance to this disease in pregnancy, and after childbirth, may yet throw welcome light on the mechanism of immunity.

Miscarriage.—I have not yet fully investigated the result of miscarriages, but of 31 of these 14 (47 per cent.) had no effect, 1 (3 per cent.) improved the patient, 16 (50 per cent.) made them worse. The onset occurred after miscarriage in four of these women (12·5 per cent.), of whom one-half died. The value of induced abortion in tuberculous women seems very questionable.

Lactation.

Out of 331 cases investigated, in 197 the mother breast-fed the child for a period from a few weeks to over three years, but in only 2–3 per cent. did lactation appear definitely to cause deterioration. The patient became gradually worse long after parturition, but before lactation ceased. I expected the effect of lactation to be much more marked, but there are many points to be considered here. Nature takes good care of us in this respect; a woman too ill to suckle is generally unable to do so. Lactation may be exhausting, but it may prove even more exhausting to get up at night to heat bottles and to deal with a child made more fretful, perhaps, by artificial feeding. And the amount of nourishment withdrawn in the first six weeks is not large. There are alsoother more subtle considerations.

The Children.—Of the offspring from the labours already considered, 372 were traced and 290 investigated personally. Of these 45 per cent. were negative, 34 per cent. tuberculous, of whom one-quarter died of the disease; 21 per cent. were suspect. Among the children unexamined by me 42 per cent. were dead from causes unknown or other than tuberculosis. We include with these most cases where the death of infants was attributed to "consumptive bowels." Compare with this the examination of 82 controls—that is, contacts of non-tuberculous persons; 87 per cent. of these were negative, 5 per cent. tuberculous, 8 per cent. suspect.

Out of 177 children breast-fed by tuberculous mothers 35 per cent. were negative, 31 per cent. tuberculous, of whom one-fifth died, 15 per cent. were suspect, 15 per cent. unseen by me, and 4 per cent. dead from causes unknown. Among 116 bottle-fed children 32 per cent. were negative, 25 per cent. tuberculous, of whom one-fifth died, 14 per cent. suspect, 14 per cent. unseen by me, and 15 per cent. dead from unknown causes. There are pitfalls, no doubt, but on the whole the increased risk to the child from breast-feeding under these circumstances seems negligible.

As concerns the husband, space does not allow the discussion of conjugal tuberculosis here. I look upon it as certain that the husband will be infected sooner or later if not congenitally immune, or with a smouldering infection of his own.

Summary.

Summing up, we find that a tuberculous woman loses nothing by marriage alone. It is unlikely to affect her either way; if it does affect her it is more than twice as likely to improve her condition as to cause deterioration. Pregnancy and parturition are likely to make her worse; there is, however, only a 50 per cent. chance of this against a 19 per cent. chance of improvement. But the children are seven times as likely to be tuberculous as those of healthy people.

As to the advice which may be given to a patient about to marry: patients who ask for such advice will not take it unless it coincides with their wishes. If the doctor says "Do not marry," and consciously, or subconsciously, the young couple are anxious not to marry, they may abide by his decision, but not otherwise. Often enough the only result of such advice is a more hasty marriage. The best way to prevent an undesirable union is to procrastinate. The advice should be "wait," expressed in as many words as may be considered appropriate to the occasion. Each case must, of course, be considered on its merits from all points of view. My figures, moreover, apply only to the poorer classes. I am now making an attempt to secure figures from better class patients.

To relatives percentages may be given. The chief risk is to the children, and this should be emphasised. A woman of marriageable age with major tuberculosis *should not bear children.* To counterbalance the loss of gratification of the maternal instinct must also be placed the risks of deterioration to the patient. Finally as to lactation. If milk is available it is wise for a tuberculous woman to breast-feed the child for six weeks certainly, longer in many cases, but never longer than eight months, and always with precautions if she is infective.

Is it possible to estimate the risks of a tuberculous inheritance as contrasted with the risks of infection by a comparison of the children of closed surgical and open pulmonary cases? I cannot yet say, but will certainly make the attempt, although if Piéry's[1] observation be confirmed, that the sweat of patients with closed surgical tuberculosis gives positive inoculation results in guinea-pigs in 30 per cent. of cases, the difficulties will be well-nigh insuperable.

[1] Piéry: Virulence et contagiosité de la sueur des tuberculeux, Acad. de Méd., March 26th, 1912.

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING AT PORTSMOUTH.

(*Continued from p. 518.*)

SECTION OF OBSTETRICS AND GYNÆCOLOGY.

WEDNESDAY, JULY 25TH.

AT the opening session, with Mr. VICTOR BONNEY presiding, Mr. A. W. BOURNE opened a discussion on

Acute Salpingitis.

He said that his paper was confined to the treatment of acute suppurative salpingitis with pelvic peritonitis. Catarrhal salpingitis never required more than the simplest medical treatment.

Clinical Description.—This was essentially an attack of acute suppurative pelvic peritonitis, with a background of genital symptoms due to acute suppuration in one or both Fallopian tubes. The symptoms were: acute pain, tenderness, and rigidity of the hypogastrium. Moderate fever. Later there are distension of the lower abdomen, constipation, and sometimes vomiting and painful micturition. In addition there are uterine hæmorrhage, leucorrhœa, and vaginal tenderness. No definite swelling can be made out, owing to the softness of the enlarged tube and the pain of examination.

Aim of Treatment.—Mr. Bourne said that the cardinal lesions requiring treatment are: (*a*) Suppurative inflammation of the tubes, and later of the ovaries; (*b*) suppurative pelvic peritonitis. These two conditions were inseparable and could not be regarded independently. The object of treatment must be: (1) to arrest the acute disease and prevent its extension to the abdominal cavity proper; (2) to prevent the formation of chronic sequelæ; (3) to restore the tube to normal function. It was very rare for the peritonitis to extend to the abdominal cavity proper, except after full-term labour, when the tube is an abdominal organ. Pyosalpinx, chronic thickenings, adhesions, &c., produced chronic semi-invalidism with relapses of acute symptoms. Bilateral salpingitis was followed by sterility.

Pathology of Acute Salpingitis.—Sections were shown on the epidiascope demonstrating Fallopian tubes in various stages of inflammation. The lumen was at first distended with pus and the plicæ were very œdematous. In the early stages the epithelium was in a fair condition. In a few places there might be desquamation. At a later stage the lumen was clear of pus, the plicæ were still œdematous, and traces of newly-formed fibrous tissue could be seen. The epithelium was still in good condition, but the ulceration was more marked. A later stage was shown when the lesion was becoming chronic. Epithelium was poor, and the commencement of adhesions was noticeable. The plicæ were still distended with exudate. The fourth stage was that of natural resolution. There was a large amount of fibrous tissue in the plicæ, while the epithelium, though intact, showed a tendency to heaping up. It was unlikely that such cells retained their cilia. The conclusions to be drawn were: 1. That in spite of a very acute salpingitis the epithelium is remarkably resistant in the early stages, and only shows partial desquamation. 2. That after the acute phase has passed off most of the epithelium surface is intact, but what lesions there are are likely to develop adhesions. 3. Plical adhesions may be very extensive in the tube, cutting up its channel into a number of diverticula which probably harbour infection and predispose to ectopic gestation.

Treatment.—Expectant and medical methods would usually lead to a subsidence of the acute symptoms and the patient "recovered." She was left sterile and the development of chronic salpingo-oöphoritis or pyosalpinx was only a matter of time. If acute salpingitis was capable of resolution as a result of medical treatment, how did chronic interstitial salpingitis arise? The commonest operation on the tube was for these chronic inflammatory conditions and the great frequency of this disease was an indication of the ordinary sequel of the disease in an acute form. Medical methods might suffice to nurse the patient through the acute stages, but she was left with a chronic inflammatory focus in the pelvis and the prospect of years of pain, menorrhagia, and sterility. The ideal treatment was to arrest the destructive inflammatory process before the desquamation of the tubal epithelium and the formation of intra-tubal adhesions and the diverticulæ and sealing of the ostium had occurred. It was therefore important to operate as soon as the disease was diagnosed. The sooner the abdomen was opened the easier it was to restore tubal function by arresting the destructive suppurative processes. The chief objections to operation in the acute stage were: (1) that it is usually "unnecessary"; (2) that it may be dangerous in spreading infection. The first objection had already been discussed and it had been shown that surgery is necessary for the treatment of chronic tubal disease. The second objection used to be urged against operation for acute appendicitis before the fifth day. It was no more valid when applied to salpingitis than to appendicitis; probably less so as the organisms of acute salpingitis were usually of a less virulent order.

Mr. Bourne had traced 11 cases of acute suppurative salpingitis operated on within a few days of the first onset of pain. There had been no deaths, and all the cases had done well. From the arguments set forth, that medical treatment was very liable to be followed by chronic disease, and that the risk of early operation was extremely small, the case for early surgical interference appeared to Mr. Bourne to be established. Further, our knowledge of the pathological processes going on within the tube indicated that the earlier surgical treatment is undertaken the better.

The Operation.—Mr. Bourne then described the steps of the operation. The abdomen is opened and the abdominal cavity proper carefully packed off. The tubes are seen to be greatly congested, and plum-coloured, with œdematous fimbriæ and pus leaking from the abdominal ostium. Plastic lymph adheres in flakes to the peritoneal surface of the tubes, intestines, ovaries, and uterus. Organised adhesions have not yet had time to form. Each tube is slit up as far as possible along the border opposite the mesenteric attachment. The pus is very gently swabbed away, and the mucous membrane carefully inspected. Should it appear intact to the naked eye—i.e., only congested without ulceration or greyish patches of necrosis—the tube should be left in situ without any further treatment beyond a few sutures of thin catgut at any point where there is arterial bleeding. Any cyst in the ovaries should be opened freely to prevent the formation of ovarian abscess. A drainage-tube is placed to the bottom of the pouch of Douglas and the abdomen closed. Drainage may be provided through the vagina. If after laying open the tube, the mucous membrane shows patches of ulceration and gangrene it is beyond the power of functional recovery and should be removed. The only possible object of preserving the tubes is to maintain their function, and if this appears impossible, owing to the extent of their destruction, the tubes should be completely removed, as then there can be no further salpingitis, and the ovary is saved considerable risk of infection. To leave the tube alone, and merely drain the pelvis, is to invite the formation of chronic tubal disease and permanent ill-health and the formation of residual abscesses.

Mr. Bourne concluded that in the many cases of acute salpingitis occurring in young women soon after marriage, in whom the certainty of future sterility is a very real tragedy, we were apt to regard the "recovery" of the patient as the chief, if not the only, aim of our treatment. He claimed that our treatment should be designed with a view also to preventing sterility, or at least morbidity. Many of these patients would "recover" in any case. Early salpingostomy would give them the chance of subse-

quent pregnancy, and if already too much damaged, salgingectomy would prevent permanent ill-health.

Desirability of Early Operation.

The PRESIDENT congratulated Mr. Bourne and agreed with him. He recalled old days at the Middlesex Hospital, when these cases were admitted and treated in the medical wards. After months of illness some of these cases developed fistulæ and discharged indefinitely. Some died. Later cases were transferred to the surgical and gynæcological wards for operation. Some of the operations on long-standing cases or cases of large hydrosalpinx were most formidable affairs, owing to the extent and density of the adhesions. Dispassionately reviewing this experience, the President came to the conclusion that this old expectant treatment was all wrong. If it were dangerous to operate early, this discussion would be futile. But it was not so. For 20 years he had been operating as early as possible, and had had good results. It was now well recognised that early operation was not dangerous. The problem remained whether the possibility of functional recovery made it worth taking an additional risk to save the tube. The President had not had a large number of cases in which he had conserved the tube. In two cases he had had to operate again at a later date for chronic disease. He had not, perhaps, done such an extensive slitting of the tube. Early operation with removal of the tube was safe. Evidence now showed that slitting the tube and leaving it was also safe. Even if the "gutter" remained open there was required evidence that the uterine ostium becomes patent. A few years ago he would have said that once a tube was sealed its function was gone for ever. Now, in the face of many plastic operations, he hoped some proof would be forthcoming that this operation might be successful. Pyosalpinx and tubo-ovarian abscesses were a disgrace to modern surgery. The parallel Mr. Bourne had drawn between salpingitis and appendicitis was quite fair. Early operation in salpingitis enabled one to save at any rate the ovary.

Dr. CARLTON OLDFIELD said that the important thing was to find a case where early salpingostomy had resulted in a subsequent pregnancy. He had investigated the cases at Leeds and had divided his cases into two groups; the first group was composed of cases where at laparotomy one tube and ovary had been conserved. In some of these cases the one tube appeared normal; in others it was inflamed and oozing pus, but appeared to him capable of recovery. In this series there were 17 cases. Results: no pregnancies. The other group consisted of cases of pelvic peritonitis. In these cases Dr. Oldfield performed posterior colpotomy, and did not open the abdomen. There was pus or serum in the pouch of Douglas. In this series there were 30 cases. Result: one pregnancy. A point in favour of early operation which had not been emphasised was that the salpingitis was frequently unilateral at first, and removal of the diseased tube might save the other.

Dr. JOHN CAMPBELL said he had strongly advocated early operation at the discussion at Glasgow last year. The difficulty was to get these cases early. But that difficulty had been largely overcome when applied to the appendix, and it was only necessary to train the profession and the public. As regards the operation itself, a weak point in the slitting up the tube was the necessity for drainage. The drainage-tube must cause adhesions. The operation of colpotomy did not come into this discussion as it was useless for acute cases. Was there any evidence that slitting open the tube predisposed to extra-uterine gestation?

Prof. R. W. JOHNSON did not agree that acute salpingitis was parallel to acute appendicitis. In salpingitis there was an inflammation of the whole genital system, and the disease itself was not dealt with by slitting and draining the tubes. One might as well open Bartholin's gland for acute gonorrhœa. The sterility was probably due to damage done to the whole genital tract by gonorrhœa. There was some danger in early operation. There was not necessarily a large mortality, but there must be some cases where the infection was spread locally, or where general septicæmia developed.

Mr. LEONARD PHILLIPS read a description of 25 cases of sterility due to sealed tubes resulting from a previous salpingitis. The lesions found varied. In some the abdominal ostium was sealed. Others had definite strictures in the length of the tube, and in others there was a stricture of the uterine ostium. The patients complained of sterility, and many of them had the cervix dilated for this. They gave a history of previous salpingitis, but had no symptoms when seen by Mr. Phillips. The conditions described were seen, as they were all cases on which he had performed abdominal section for plastic operation on the tubes. Of this series there were five cases who had subsequently become pregnant. Mr. Phillips demonstrated by diagrams four different types of operation for the different lesions he had found and described the operations in detail.

Dr. GILMORE CURRIER showed an apparatus for passing gas through the cervix to determine the patency of the tubes. The apparatus consists of a "sparklet" bulb, a steel bulb containing compressed CO_2 and a high pressure valve for controlling the flow of gas, which is led by a tube to a water meter and thence to a hollow uterine sound. Connected to this is an ordinary mercury manometer. The hollow sound is made of pure tin and can be bent into any desired shape. A certain distance from the end is a rubber "acorn" which, by being pressed against the external os, prevents the regurgitation of gas. With the usual surgical precautions the sound is passed and the gas turned on slowly. The pressure rises in the manometer. If the tube is patent the pressure does not rise above about 80 mm. of mercury. There are slight variations in individuals. By the meter it can be observed that gas is passing into the abdominal cavity. This can be confirmed by X ray. If the tube is not patent the pressure gradually rises. It is not advisable to allow the pressure to go above 200 mm.

Mr. L. C. RIVETT had seen a demonstration of Dr. Currier's apparatus and had observed the difference when the air passed through the tubes or was held up. It would obviously be of great value in the cases recorded by Mr. Phillips, both in diagnosis and in inflating the tubes during laparotomy. As regards Mr. Bourne's paper, Mr. Rivett was in agreement with this method. He was not sure that it was necessary to remove the tubes, even when definitely damaged, as Mr. Phillips's cases proved that it was worth conserving a tube whenever possible; even if resolution was not sufficiently complete to leave it patent, this could be remedied at subsequent operation. The danger of septic secondary hæmorrhage in the delayed operation had not been mentioned. The risk was absent in the early operation.

The PRESIDENT, in calling on Mr. Bourne to reply, said that there was not the clear consensus of opinion that he had hoped for. He was disappointed that there was no case recorded where early salpingostomy had resulted in a subsequent pregnancy. Mr. Phillips's results were remarkably good and he could not help thinking Mr. Phillips had been a little lucky. The President was interested in Dr. Currier's apparatus and thought it would be most useful.

Mr. BOURNE replied.

THURSDAY, JULY 26TH.

Mr. COMYNS BERKELEY opened a discussion on the

Use and Abuse of Forceps.

He drew attention to the unsatisfactory position of the forceps operation to-day. The blame was not all on the family doctor and the teachers of obstetrics must shoulder their share. The General Medical Council could prescribe more stringent rules and regulations. The majority of students were not going to operate when they got into practice, and yet, before they could sit for their final examination, they

must spend three months in the out-patient and six months in the in-patient surgical departments of their hospital. The majority of students were going to practise midwifery, and yet many of the examining bodies did not compel them to attend any cases in hospital, and there was no rule that any of the 20 cases should be delivered under the immediate supervision of the chief of the department. The only way to obtain a real knowledge of the bad results of midwifery, and among other things the abuse of forceps, was to attend the practice of the gynæcological ward, and yet this was not compulsory. The whole difficulty in teaching obstetrics was that of obtaining sufficient material. There are far too few lying-in hospitals, and the few obstetric beds in general hospitals are often filled with difficult and abnormal cases. In the medical and surgical wards one patient was available for the study of many students, but in the obstetrical wards one patient was only available for one student. A proper hospital obstetric service was an absolute essential to the efficient teaching of midwifery.

Ante-Natal Treatment.—The true conduct of labour began with ante-natal treatment. Although the forceps on occasions must be and should be used, the less frequently this instrument was employed the better. The proper way to accomplish such a reduction is by efficient ante-natal supervision.

No doctor should agree to attend a woman in labour unless he was prepared to examine her on occasions, more especially in the last few weeks of pregnancy. It was not compulsory for a student to attend the ante-natal department, always supposing there was one. Many men do not mind admitting that they were not always sure whether the head of the child was engaged or not, and yet the head remained the best pelvimeter we had got. The better the doctor was at abdominal palpation, the fewer vaginal examinations he had to make.

The forceps was used most frequently for inefficient pains and disproportion between the head and the pelvis. Proper ante-natal supervision, by getting the patient into as good a state of health as possible, could do much to help the efficiency of the pains. Proper ante-natal examination would lead to the detection of disproportion between the head and the pelvis, of malpresentation, and of those cases of minor contraction in which the head of the child was not engaging as it should—a knowledge of which might easily avoid the abuse of forceps. A man in general practice had very little need to perform surgical operations, but many of the operations in midwifery he had to perform, whether he liked it or not, whilst the public expected him to use forceps as a matter of course, and this without a proper training. In most surgical operations the surgeon made ample arrangements, and was well paid. In the majority of forceps operations arrangements were not made beforehand and the doctor was certainly not well paid.

It was impossible to sterilise the vagina. It was therefore impossible to pass anything into the uterus, be it fingers, hand, or forceps, without potentially infecting it; and moreover from the darkness, warmth, and serum present the uterus rivalled in its ability to encourage the growth of pathogenic organisms any suitably prepared culture-tube in a bacteriological laboratory. If a non-operating practitioner performing a small operation found a big one was necessary he would get expert help. The trouble was that an ordinary pull with the forceps having failed, the doctor did not realise that he was up against something serious. He did not get help, but pulled all the harder. It might be impossible to obtain an anæsthetist, but there was no reason why rubber gloves should not be carried in every midwifery bag, and there was no difficulty in shaving the vulva or in applying an antiseptic. He feared that in the majority of cases rubber gloves were not worn, nor was the vulva shaved. With the ordinary operation the surgeon was not persuaded by the patient or her relations to operate; on the contrary, the strongest objections might be raised by the one or the other. But the doctor attending a confinement was liable to be constantly reminded that Mrs. So-and-So had instruments and labour was terminated quickly and easily. That the forceps was often used unskilfully was due to the fact that, in the past at any rate, a large number of men had not seen them employed before going into practice.

Methods of Using Forceps.—The methods of using the forceps were open to abuse. The instrument could be used as a tractor, compressor, rotator, lever, and stimulator. In Mr. Berkeley's opinion the only warrantable use to which the forceps should be put was that of a tractor. Certainly there were better and safer ways of stimulating uterine contraction. None, except the most ignorant, would in these enlightened days think of using the forceps as a lever. All the cases which he had known, in which such a use had been made of the instrument ended disastrously for the mother, either in fearful laceration or in her death. He knew that many practitioners thought that in cases of persistent occipito-posterior positions, rotation with the forceps is a good method of treatment, and it was often used as a first choice. In nearly every case, especially where the patient had been watched carefully in the early stages of labour, it was possible to rotate the head and shoulders with the hands. The child certainly was more likely to be injured with rotation by the forceps, and he had seen most serious laceration of the mother. To use forceps to make the diameter of the head smaller—that is, as a compression—was absolutely wrong. This instrument must exert a certain amount of compression unfortunately, but this must be avoided as far as possible by allowing its handles to remain loose at frequent intervals. There remained traction, the one proper use to which this instrument could be put. Even this use was frequently abused. The force used should be strictly limited. There existed doctors who stated that they had to pull with all their strength, perhaps with the aid of one foot against the bed. If great force had to be used, it is a sure indication that forceps was not the right treatment. It was an abuse to apply forceps too soon—that is, before the cervix is fully dilated, either by Nature or, in cases of necessity, by hand; or in cases of disproportion, before the head had had time to mould. To apply the forceps in exhaustion of the uterus, or after the death of the child, was to apply too late. It was not fair on the forceps to use it before emptying the bladder with a catheter, neither was it fair on the patient. A vesico-vaginal fistula might easily result in the absence of such precaution, and yet some people were so apt to forget this that they always kept a catheter tied to one blade of the forceps. Lastly, if difficulty was experienced in applying the forceps by one who was accustomed to use this instrument, this was generally an indication against the operation.

Advocates of frequent use of forceps claimed that it shortened the woman's suffering. Was this worth the increased risk? Many asserted that they get less tears, but laceration of the vaginal walls and cervix might not be recognised, and Mackenrodt's ligaments were often badly stretched. It was more difficult to maintain asepsis if forceps was used. Those who were in charge of lying-in and gynæcological beds were constantly having brought to their notice the disastrous results of the unskilful use of forceps—such as rupture of the uterus, rupture of the vagina, fistulæ of the bladder and rectum, whilst fracture of the pelvis was not unknown. During the last year Mr. Berkeley knew of two cases in which the blades of the forceps had been forced through the vaginal walls and applied outside the lower uterine segment.

Indications for Forceps.—A doctor should never use the forceps merely to suit his own convenience; such use, to say the least of it, was unscientific. The rule that if a primigravida had been in the second stage of labour for over two hours, or a multipara for over an hour, she should be delivered was a most pernicious one. If the delay was due to inefficient pains, forceps

should be used when they were becoming inefficient; when they had ceased post-partum hæmorrhage was lurking round the corner. If the delay was due to slight disproportion accurate diagnosis was of utmost importance. External measurements of the pelvis mostly indicated the shape, and the diagonal conjugate only showed gross contraction. In medium contraction the practitioner should not interfere unless he is forced to do so. He should be guided by the condition of the mother and child, and if this was satisfactory he should hold his hand. It was far better that the second stage of labour should last six hours than that the mother and child should be injured or killed. If the head was movable above the brim forceps should never be employed. If there was the least doubt about the head being able to pass the brim, forceps should not be used, as this only increased the danger if Cæsarean section was decided upon. Munro Kerr had reported that since the abolition of "high forceps" in the institutions with which he is connected spontaneous delivery had become more common.

Dr. JOHN FAIRBAIRN said that too much reliance had been placed on the forceps. Our first line should be to investigate and treat so that patients should have a normal labour. Ante-natal supervision should eliminate malpresentations and misfits. Once the doctor had satisfied himself that everything is normal the greater part should be left to the midwife, and the doctor, with the rattling bottle of chloroform, should be kept in the background. Hypnotics should be given if required. The fees now paid were too small, and the general practitioner cut the loss by time-saving devices which were equally appreciated by the patient. Mr. Berkeley had suggested that the teachers should supervise the students. Dr. Fairbairn did not agree; he considered that this would be using a steam hammer to crack a nut.

The PRESIDENT (Mr. VICTOR BONNEY) agreed with the views expressed by Mr. Berkeley and Dr. Fairbairn, but they were idealistic. The lot of the general practitioner was hard, and unless he pleased his patients he lost custom; patients and relatives constantly pressed doctors to get on. The President had always advocated that obstetrics should be more surgical. It should be properly paid and properly arranged for. Full dilatation of the cervix was a misunderstood term. It was generally interpreted to mean the cervix sufficiently dilated to allow the head to come through; the term should be altered to "head *through* cervix." In regard to abdominal palpation, it is always a matter of opinion whether a head would come through. Anyone might make a mistake, and when it was found that the head would not come through, the mistake should be admitted and no attempt should be made to use undue force. Sometimes other methods of delivery should be adopted. Perforation was not done often enough when forceps failed after a reasonable chance. The woman should be left fit to bear another child.

Dr. T. A. M. FORDE thought that the provision of more beds could only be realised by establishing special lying-in hospitals. Lunacy and fevers were already learnt by the student outside the teaching school and midwifery should be on the same basis. There should be more opportunities for post-graduate work.

Prof. R. J. JOHNSTONE said he agreed that the teaching was poor, but when he had suggested that every student should *see* five obstetric operations before being signed up, it was turned down by the teachers, who said they had not time or cases. Puerperal sepsis often occurred when forceps had *not* been used. This was not a matter for congratulation. The perineum should be more efficiently cleaned up in normal deliveries.

Dr. H. B. MCCASKIE said that from the general practitioner's point of view these ante-natal precepts were rather disturbing. Practitioners often came home at 4 A.M., congratulating themselves on having saved two lives. Now it appeared they should regret that they did not examine the case a month before. The general practitioner did not see much sepsis after forceps.

Dr. C. E. DOUGLAS gave an excellent description of the life of a country practitioner in Scotland.

Colonel A. BUCHANAN showed some models which he was demonstrating in the afternoon, and pointed out how they indicated when to use forceps.

Many other speakers, including Mr. R. A. HENDRY, Dr. J. CAMPBELL, and Mr. L. C. RIVETT took part in a very interesting and full discussion, and Mr. BERKELEY replied.

SECTION OF RADIOLOGY AND ELECTROLOGY.

WEDNESDAY, JULY 25TH.

Dr. GILBERT SCOTT (London), President, introduced Dr. R. W. A. SALMOND (London), who read a paper on the

X Ray Examination of the Urinary Tract.

Dr. Salmond in his opening remarks said that the success of X ray examination of the urinary tract depended upon two main factors: (*a*) proper technique, and (*b*) accurate interpretation. Under the head of technique the speaker directed attention to the undermentioned points: (1) The apparatus used should be capable of making the correct exposure in a fraction of a second, or in two or three seconds at the most. It was possible to do good work with longer exposures provided the kidneys were kept at rest by efficient compression. In any case compression should be used. (2) Preparation of the patient should consist in a regimen of light diet for two or three days, with an aperient on the two evenings preceding the examination, followed by an enema on the day of the examination. (3) The tube should have just sufficient penetration to get through the parts. (4) The film should include the last two ribs and iliac crests and the back should be in close apposition to the film. (5) The central ray should be directed through the level of the second lumbar vertebra with the extension tube pointing under the costal cartilages. (6) In all cases the whole urinary tract on both sides should be examined. (7) In the examination of the ureters the tube should be parallel with the film. (8) In examining the bladder the tube must be tilted in such a way that the extension tube points well into the opening of the pelvis so that the pelvic bones do not hide any shadow at the base of the bladder. (9) The Potter-Bucky diaphragm gives excellent results in these cases.

Under the head of accurate interpretation Dr. Salmond said that in all cases where a doubtful shadow is found confirmatory films should be taken on another day after further purgation. Lateral views of the kidneys could be taken to show better the relation of the shadows to the kidney or ureter and were especially useful in differential diagnosis. In stout people the outlines of the kidneys were best shown by inflating the perirenal fat with 200–600 c.cm. of oxygen or CO_2. The kidney could also be shown by inflating the peritoneum and this method was good for showing renal tumours, though not free from danger. The most simple and the safest method was to pump air into the colon, a method which was also painless. Pyelography consists of injecting an opaque solution into the pelvis of the kidney through a ureteral catheter. 10–20 per cent. solution of sodium iodide or bromide is generally used. Collargol should be avoided, being too irritating. Pneumo-pyelography is a similar method except that oxygen is used instead of the solution. It does not obscure stones as does the opaque solution. To demonstrate the bladder it should be filled with a 10 per cent. solution of sodium iodide or an emulsion of barium and oil. Diverticula and calculi can be seen, but films should be taken at different angles.

As regards diagnosis, the normal size of the kidney must be clearly visualised. Marked difference of the two sides was pathological. Kidney stones were shown superimposed on the kidney shadow and always had the same relation to it on movements of respiration. However, the pelvis and calyces were

usually characteristic. Viewed laterally they were seen superimposed over the bodies of the first to the third lumbar vertebræ. Shadows in the kidney area might be due to intestinal contents, calcified glands, calcification in a tuberculous or malignant kidney, or to foreign bodies. Calcified glands generally presented a mottled appearance and had extreme mobility; the lateral view showed them in front of the vertebræ. Gall-stones usually showed a clear central nucleus and denser peripheral area, and these moved vertically on respiration. Multiple stones were characteristic. Stones in the ureter were usually small and oval. They might travel up and down the ureter. Calcified abdominal glands, accessory epiphysis for the tip of the transverse process, concretion in the appendix, phleboliths, might all be mistaken for ureteral calculi. When a diagnosis could not be made it might be necessary to pass an opaque bougie up the ureter. Vesical calculi were usually larger than renal ones and were generally oval in shape. Often they showed different densities due to the deposit of layers of different chemical compositions. Diverticula were demonstrated by filling the bladder with an opaque solution and taking films at different angles. After the fluid was voided the diverticulum might remain filled. The differential diagnosis of vesical calculi was to be made from prostatic calculi, fæcal masses, calcified fibroid, dermoid cyst, and foreign bodies. In the detection of urethral stones the tube must be well tilted to avoid the pubic arch. For these the commonest site was the prostatic urethra, but stones might be found in any part of the urethra and might be formed by phosphatic deposit behind a stricture. Uric acid stones would not cast a shadow, and radiologists should mention this in reports on negative cases. All other stones threw a definite shadow. Calcium oxalate cast the densest shadows, then phosphatic deposits, and lastly those composed of urates. Cystin and xanthin stones gave a shadow due to the contained sulphur element. Stones were frequently found in infants and children and might produce no symptoms for years. With the proper technique and assistance of the more elaborate methods and with accurate diagnosis in collaboration with a urologist there is no doubt that the value of X rays in urinary diagnosis, especially as regards the presence or absence of a stone, is of the very highest importance.

Mr. R. OGIER WARD (London) pointed out that, contrary to the usually accepted opinion, pyelography was neither difficult, dangerous, nor painful; though it might be tiresome perhaps to the radiologist and the patient. He did not approve of the administration of an anæsthetic, the sensation of the patient being an important guide. The solution recommended was 20 per cent. sodium bromide injected at body temperature. Mr. Ward said the chief use of pyelography was in the determination of the condition of the kidney. He also mentioned that X rays were of value in ascertaining the presence of prostatic calculi.

Dr. L. A. ROWDEN (Leeds) advocated the merits of screen examination with palpation, and pointed out the following advantages of this method: (1) correct quality of rays for the particular case in hand can be obtained; (2) the kidney triangle can be accurately illuminated; (3) the movement and position of any shadow or shadows can be noted; and (4) the shape, size, and density of any shadow can be observed and also whether the object causing it is nearer to the anterior or posterior abdominal wall. He referred to a paper published by him in 1910 on the value of screen examination in the diagnosis of renal calculus and said that since that time they had found it of the utmost value. Dr. Rowden prepares his patient for three days, giving a light diet and a vegetable aperient sufficient to cause two or three loose motions a day. He deprecated the use of enemata as having a tendency to form gas in the colon. He pointed out that the skin of the lumbar region should be examined for pigmented moles, as these may cause a slight shadow. The patient should be placed on the X ray couch face downwards, with a cylindrical air cushion under the abdomen just below the costal margin. The X ray tube is placed under the couch in a large lead-lined box which is free to move in any direction on wheels. The diaphragm should be fixed, small and tubular, and by running the tube-box up and down the couch and from side to side the whole of the kidney area can be quickly examined. A calculus which can be quite distinctly seen through a very small diaphragmatic opening rapidly disappears when the opening is enlarged. Certain fallacies may occur with this method, and Dr. Rowden pointed these out and indicated how they might be avoided. He said that shadows not caused by calculus within the renal triangle may be due to: (1) calcareous mesenteric glands; (2) calcareous retroperitoneal glands; (3) foreign bodies, as pills, scybala; (4) calcareous deposits in lower costal cartilages in old people; (5) phleboliths; (6) calcareous deposits in a tuberculous kidney; (7) pigmented moles on the back; (8) mottling of the renal area due to gas in the intestines; and (9) gall-stones.

Dr. G. B. BATTEN (London) gave details of an interesting case of renal calculus with several stones on one side and a large one on the other.

Dr. JAMES METCALFE (London) emphasised the importance of correct technique and insisted that the film was more accurate than any visual observation could possibly be. Dr. Metcalfe also referred to the work of Dr. Carelli, of Buenos Aires, in perinephritic injection of oxygen and carbon dioxide. Dr. Metcalfe bore testimony to the use of the Potter-Bucky diaphragm in renal radiography, especially in fat people.

Dr. R. MAITLAND BEATH (Belfast) showed diagrams of, and drew attention to one of the conditions in which pyelography was of great value. This condition consisted of a kinking of the ureter with an abnormal renal artery bending round it and compressing it. Without pyelography it is doubtful if this condition would have been recognised, but having been diagnosed by this means the artery was divided and the condition relieved.

The PRESIDENT, in summing up, dealt with the subjects and with the questions that had been raised in an extremely practical manner. His chief points were as follows: (1) Preparation of the patient—i.e., castor oil the night before, and light diet. (2) Efficient compressor and efficient compression. He used a sugar-loaf cushion filled with picked lamb's wool. This was passed just under the costal margin and pressure applied. (3) The tube above the patient. (4) Length of exposure. In connexion with this he said that lightning rapidity was not essential. (5) The extreme value of showing the renal outline. (6) Perirenal inflation, which he said was not done often enough. (7) Team work between the surgeon and the radiologist should be encouraged.

Dr. SALMOND replied briefly, and said that in his experience he had found that gall-stones were not homogeneous as quoted by Dr. Rowden, but that they were less dense at the centre.

THURSDAY, JULY 26TH.

Dr. GILBERT SCOTT (London) surrendered the chair to Dr. W. J. TURRELL (Oxford), who thereafter presided until the close of the meeting. Dr. Turrell announced three papers on

Medical Diathermy.

Dr. E. P. CUMBERBATCH (London) said that medical diathermy could produce therapeutic results that no other form of treatment could effect. At present there was a pressing need of larger and more powerful machines; with electrodes measuring 8 in. by 4 in. the current density was low, even if the machine were used "all out"; larger electrodes than these were required for abdominal work, but with the present machines there would be very little heating effect. Air spark-gaps with mica washers became too hot with prolonged use and the current was cut down. Gaps working in an atmosphere of gas, and which could be regulated while working,

were preferable, but in these there was an accumulation of soot, so that they required cleaning after about ten hours' use. It would be an advantage if the metal surfaces of the gap could be replaced when worn, as they corroded and became uneven after much use. In treating the abdomen the current had little resistance to overcome, so that the amount of heat generated was small, and it was quickly conducted away owing to the abundant blood-supply of the organs. When a thermometer was placed in a deep sinus in the kidney region following a nephrectomy no rise in temperature was recorded, although the current was passed for 20 minutes at 1·2 ampères, the electrodes measuring 8 in. by 4 in. Fürstenburg and Schemel measured the heat generated in the stomach with a special instrument. Using 12 in. by 8 in. electrodes and a current of 0·3 ampères the maximum rise was 0·4° C., and with 2 ampères a rise of only 0·1° C. was obtained. It was possible that strong heating of the skin sensory nerve-endings caused a reflex stimulation of the deep circulation, so that the heat was more rapidly conducted away. It must not be assumed, therefore, that maximum current and maximum heat produced the best results. In the case of mucous membranes the low resistance required a stronger current to produce the same degree of heat.

Good results had been obtained in the treatment of gonococcal infection of the joints and other parts. Nagelschmidt claimed excellent results in treating angina pectoris; and præcordial pain in arterio-sclerosis had been relieved by the application of diathermy to the heart region. Bordier spoke highly of its use in the treatment of cold paralysed limbs in anterior poliomyelitis. It was most valuable in the treatment of pains and spasms accompanying hæmorrhoids when applied by means of a rectal electrode.

Diathermy was an efficient means of treating dysmenorrhœa by relieving the congestion and spasmodic contraction. Bordier treated one case by placing one electrode in contact with the cervix, the other being on the hypogastrium. It should also be tried in para- and peri-metritis.

Diathermy had been tried by workers in the U.S.A. and in Germany for pulmonary tuberculosis, and it had been said that the symptoms were greatly relieved. If it possessed any therapeutic action it must be due to the increased blood and lymph flow and not to any germicidal action, as the temperature employed was not sufficient to kill the bacilli. Hypothermia, local and general, neuritis, and high blood pressure are all amenable to this treatment.

Dr. C. A. ROBINSON (London) amplified the remarks of Dr. Cumberbatch on the use of diathermy in the treatment of gonorrhœal rheumatism. He had treated some 120 cases, 18 of which were confirmed bacteriologically, and he was convinced of the utility of the current in this disease. It was necessary to treat not only the joint, but also the focus of infection; in fact, it was in all probability this latter which was the more important. He deduced this from his observations in cases of gonorrhœal arthritis in the female, in which the cervix only had been treated. Dr. Robinson, in these cases, gave three to five treatments bi-weekly, from 500 to 1000 milliampères, the uncovered portion of the sound measuring ¾ in. if for the cervix, and 1½ in. if for the urethra. In the male the application was made to the prostate, and sometimes to the urethra, though this latter method had not been so satisfactory. Dr. Robinson used the pure tin electrode for the cervix; in cases of gonorrhœal epididymitis he used a soft lead electrode. Satisfactory results had followed all these applications.

Dr. F. HOWARD HUMPHRIS (London) read a paper enlarging upon the use of medical diathermy in the reduction of high blood pressure, in pneumonia, and in tuberculosis, both of chest and joints. In hyperpiesia—that is, in the pre-sclerotic state, which might exist without any sign or symptom—medical diathermy administered on an auto-condensation couch might check the process of degeneration and prevent arterio-sclerosis taking place. Dr. Humphris gave a group of symptoms, chiefly functional, which might indicate a commencement of arterial change. There might be, he said, attacks of transient giddiness, a heavy oppressive fullness in the head, headache often intensified with effort of mental concentration ("the sign of painful thought"), or the headache might be pulsatile in character; there might be insomnia or drowsiness, especially in the morning, with a disinclination to work and an inability to concentrate the attention, alternating perhaps with an irritability of temper and occasionally with a mild psychic exaltation with a confusion of ideas; failure of memory, noises in the ears, migraine or neuralgia, general nervousness with anxiety, or a sense of impending evil impossible to define.

The way in which the current acted in lowering blood pressure could be said to be twofold. One, the general or constitutional effect as affecting metabolism, and the other, the local effect as on the vasomotor system. These had been demonstrated both chemically and clinically. He pointed out that even when arterio-sclerosis was established, by the use of this current a patient could be kept in a condition of safety. Dr. Humprhis urged the use of diathermy in cases of pneumonia. The treatment, he said, was a rational one and one not difficult of application. The electrodes measured about 5 in. by 3 in., and one was placed on the back and one on the front of the congested area. With the heat applied directly through the pneumonic patch a dilatation of the vessels, and consequently a decongestion, took place. The increase in temperature was beneficial, probably because it exercised a deleterious effect upon the bacilli causing the disease. A few treatments appeared to cause a rapid amelioration of the symptoms. Notably the breathing became easier and the cyanosis lessened, indicating that increased air absorption by the lungs was taking place and the heart was better able to perform its functions, owing to the diminished resistance in the pulmonary circulation.

He wished to associate himself with Dr. Cumberbatch in his remarks on pulmonary tuberculosis, and indeed in tuberculosis of bone as well, and this again, he thought, was due to the fact that the current caused a rise in temperature in the tissue through which it passed. Certainly the local increase in temperature, with the resultant improvement in the circulation and lymph flow, favoured phagocytosis, metabolism was more active, toxins were eliminated, and with the diminished fighting power of the bacillus and the increased resistant power of the body the current assisted a return to normal in the tuberculous areas. The method of treatment of tuberculosis is deserving of fair trial, and it would certainly seem to offer symptomatic relief and possibly a radical cure. Other countries, as Dr. Cumberbatch said, were trying it, but in so important and urgent a matter as the treatment of tuberculosis by electricity why should other countries lead?

Dr. TURRELL said that the secret of success in medical diathermy consisted in administering currents of moderate intensity for long periods, such as 40 minutes or an hour, and not in giving intensive treatments of short duration. He said that the object in administering medical diathermy was not merely in order to heat the tissues by the conversion of electrical energy into heat energy within the body, but in order to obtain the consecutive effects of this heat, namely, the relaxation of spasm, the increased tissue drainage, the increased nutritional effects, &c., which were brought about by the increased blood-supply resulting from the generation of heat within the tissues in the body. There was a mass of experimental evidence that the abdominal organs were heated by diathermy in the same manner as any other organs of the body, though not perhaps to the same extent, for owing to their more free blood-supply there were larger numbers of hydrogen- and hydroxyl-ions present. Their conductivity was therefore higher and their resistance lower,

consequently they retained heat less than the other organs. Moreover, not only were the abdominal organs very efficiently "blood cooled" in this way, but they were very directly affected by the heat regulating mechanism of the body, as was well shown by the experiment of Fürstenburg and Schemel quoted by Dr. Cumberbatch. Teleman, as early as 1911, experimentally heated nearly all the organs of the body in animals by diathermy. The experiments of Berndt and Preyss on animals afforded further proof of the heating effects of the diathermy currents on the abdominal organs. These two workers pointed out the danger of overheating the intestines by diathermy when they were distended with gas. In such cases they found that there was a danger of a great intensity of current on the inner coating of the intestine, and that this caused in some of their experiments a necrosis of the intestinal folds.

The time had arrived, Dr. Turrell said, when we should discuss diathermy not in relation to its action in isolated cases and diseases, but rather in relation to its mode of action. In this way we should better realise what a very wide range of application it possessed. We should not turn to an index of electrical treatment and look up Neuritis—diathermy; Chilblains—paraffin wax bath; Acne—ultra-violet radiation, but we should ask ourselves, would this case of spasmodic dysmenorrhœa be relieved by the relaxation of spasm consecutive on diathermy? Would this unresolved pneumonic lung be improved by an increased arterial blood-supply and accelerated tissue drainage, and could these results be secured by diathermy? That, he submitted, was the scientific method; and if we adopted it we should soon recognise in what a large number of cases the consecutive effects of diathermy are beneficial. Dr. Turrell said that in cases of arthritis of the hip he is in the habit of using electrodes 20 by 10 cm. with 2 ampères for 40 minutes once a week for a year, this having a prelude of daily treatments for a short time, then treatments three times a week, then twice a week before commencing the weekly régime. In dysmenorrhœa and coccydynia he had found diathermy very useful. Pain in hæmorrhoids he had seen relieved even after it had existed for four years. In fact, he foresaw the time when no ward in a hospital, either medical or surgical, would be complete unless there were a diathermy apparatus installed therein.

Dr. BATTEN pointed out how the diathermy currents had a definitely deleterious effect on the growth of the bacilli. He had had good results in the application of diathermy to the tonsils in cases where tonsillectomy was contra-indicated. He endorsed the opinions of the previous speakers on the value of this current in hæmorrhoids, and said that, speaking from an experience of 25 years, he knew of cases that had remained well for four or five years, with absence of pain.

Colonel C. B. HEALD (London) agreed with all that Dr. Robinson had said in regard to gonorrhœal arthritis. He had also had uniform success in the treatment of cold limbs occurring in the different forms of paralysis, especially anterior poliomyelitis, and he instanced one case which was of 14 years' standing. Colonel Heald emphasised the need of educating colleagues who knew much medicine but needed enlightenment in electrical matters.

Prof. S. RUSS (London), in discussion, remarked upon the desirability of extending the observations with diathermic currents of still higher frequency than were at present used. He also thought that it would be useful to refer to the current passing through the tissues in terms of the current density, which was a rather more exact specification. It was worth noticing that even with the same current density the rise in temperature in the tissues would be greater with large electrodes than with small, owing to the smaller proportionate heat dissipation. In cases where the rise in temperature was very small it would still be of interest to know whether any physiological effects were observed, and if so the question would arise as to whether these effects were in any way due to the oscillatory magnetic field. The effects of magnetic fields of lower frequency had been studied to some extent, practically the only substantiated physiological effect being that upon the eye.

Dr. AGNES SAVILL (London) stated that she had some experience with the treatment by diathermy of gonorrhœa in women, combined with ionisation, and recently had two cases that had responded well to this method, when curettage and treatment in skilled hands by the more established methods had failed. Dr. Savill used a copper electrode and 1 ampère for 10 to 12 minutes, which was followed by immediate improvement. Her results were checked by bacteriological examination.

Dr. FLORENCE STONEY (Bournemouth) reported good results with diathermy in Raynaud's disease, chilblains, and in the reduction of high blood pressure.

Mr. DAVID LEES (Edinburgh) had had experience in the treatment of gonorrhœa in women and gonorrhœal infection of the prostate, and in a case of acute prostatitis thought that it should be tried, and he would expect at least symptomatic relief. Mr. Lees thought that it would also seem to be a reasonable remedy for ophthalmia neonatorum, and asked if it had ever been used.

Dr. ROBINSON, in reply, said that he would certainly like to see it used in gonorrhœal ophthalmia. It would be eminently easy to apply, and it afforded a rational means of cure. He would also like to see it employed in cases of malignant endocarditis. Many of these cases were due to the gonococcus, and as nothing else was of much avail he thought diathermy should be tried.

SECTION OF VENEREAL DISEASES.

FRIDAY, JULY 27TH.

With Sir ARCHDALL REID, President of the section, in the chair, a discussion was opened by Mr. KENNETH WALKER (London) and Dr. DAVID WATSON (Glasgow) on the

Prevention and Treatment of Chronic Gonorrhœal Prostatitis and Vesiculitis.

Mr. KENNETH WALKER, who dealt mainly with chronic prostatitis, drew attention to the importance of the prostate as a gateway by which organisms entered both the blood and the lymphatic stream. As a rule, prostatitis and vesiculitis were associated conditions, and considerable confusion in diagnosis between them frequently occurred owing to the fact that the vesicles lay along the upper edge of the prostate in a horizontal position, and to the examining finger induration of the vesicles was, as a result, mistaken for induration of the prostate. However, as the treatment of the two conditions was in the main the same, errors in diagnosis were not of great importance. Of all the therapeutic measures available in the treatment of chronic prostatitis, prostatic massage was the most important. In his opinion the emptying of the follicles brought about by massage was achieved *indirectly* through the contraction of the muscular coats of the prostate rather than by *direct* pressure from the massaging finger. In order to see whether electrical stimulation of the prostatic muscle would prove as efficient as digital massage, he had been experimenting in the venereal department of St. Bartholomew's with a slowly interrupted faradic current applied to the prostate by an electrode in the rectum. Good results had also been obtained with a similar electrode and diathermy, but it was too early yet to say whether electric stimulation of the prostate was as efficacious as digital massage. Another method of treatment that was extensively used was dilatation of the posterior urethra by the passage of large-sized bougies or of special dilators. The bougie probably acted in a similar manner to massage in stimulating the prostate to contract. A Kollman's dilator should, in the speaker's opinion, never be used in the posterior urethra, as it was anatomically impossible to achieve a uniform dilatation of such a complicated cavity as that of the posterior urethra. Already a reaction

was taking place against what he would term the great metallic age in the history of the treatment of gonorrhœa. Chronic gonorrhœa was a deep-seated infection, and increasing the variety of urethroscopes, dilators, electrodes, and flushing bougies that were available to the urologist would not lead to final victory. This would be achieved through the biochemist and the bacteriologist rather than with the help of the instrument maker. Although the vast majority of cases of chronic prostatitis finally yielded to patient and prolonged treatment, in a few cases the speaker had been forced to fall back on incision of the prostate and drainage of a small chronic abscess cavity.

Dr. DAVID WATSON, in introducing the subject of chronic vesiculitis, emphasised the importance of prevention of the extension of infection to the posterior urethra. He employed posterior irrigation as a routine treatment in all cases of anterior urethritis, and considered that its use diminished the risk of posterior infections. The second most important preventive measures were rest during the early stages of the disease and the avoidance of trauma to the posterior urethra. Although Mr. Kenneth Walker had pointed out that the spread of infection might occur via the lymphatics, it was practically certain that the great majority of cases of epididymitis resulted from a reversed wave of peristalsis passing down the vas. For this reason he employed atropine as a sedative and as a prophylactic to prevent extension to the other vesicle or the other epididymis. Vesiculitis, in spite of what American surgeons stated, was a rare disease, and he could not understand why American literature should lay so much emphasis on such surgical proceedings as vesiculectomy and vesiculotomy. In his opinion, these operations were very rarely required, although possibly vasotomy or the injection of the vesicles by the vas might occasionally be required.

Mr. DAVID LEES (Edinburgh) stated that though in the main he agreed with what the previous speakers had said, there were certain points on which he must differ. He did not advise posterior irrigation as a routine measure in cases of anterior urethritis. In the majority of cases of early anterior urethritis treatment was carried out by the patient himself or by a more or less skilled orderly, and the risk of trauma to the urethra was too great to make posterior irrigation a safe proceeding. Of the fluids that might be used for irrigation, in addition to those more commonly employed, mercurochrome and nizin had been found to be useful. Like Dr. Watson, he used atropine as a prophylactic measure in the acute stage of the disease, giving it in doses of 1/75th of a grain in a suppository. He had also found sulfarsenol of use in the acute period, but not in the chronic. He agreed with Mr. Kenneth Walker that the action of prostatic massage was probably indirect through the contraction of the prostatic muscle. It was of interest to find Mr. Kenneth Walker in one paragraph advocating the use of a new and rather alarming rectal electrode, and in the next damning the great metallic age in the treatment of gonorrhœa. However, he agreed with him that bacteriological measures, combined with chemical, held out a greater hope of finality in treatment and in permanence of cure.

Dr. A. E. CAMBELL (Portsmouth) dwelt on the importance of early treatment in preventing the development of such serious complications as prostatitis and vesiculitis. Personally he observed the following rules when treating cases of acute gonorrhœa: (1) Never to force irrigation on an unwilling or nervous patient. (2) Never to attempt posterior irrigation during the first week or in the acute stage of the attack. (3) Never to massage the prostate or vesicles for diagnostic purposes until the urine was clear. (4) Never to pass any instrument into the bladder in a fresh uncomplicated case of gonorrhœa. He divided cases of chronic prostatitis and vesiculitis into two categories—cases in which there were no signs or symptoms beyond the existence of pus in the expressed secretions, and cases accompanied by urinary symptoms or by metastatic lesions, such as chronic rheumatism or iritis. In the former class of case vaccines produced little effect, but in the latter they were often of benefit. In addition to the methods of treatment already discussed, he had found the application of heat by a water-heated apparatus in the rectum of use.

Surgeon-Commander R. J. G. PARNELL agreed with Mr. Lees that detoxicated vaccines were of most value in the acute early stages of the disease. Less than 5 per cent. of cases at Haslar suffered from vesiculitis, and, in his opinion, prostatitis was much more often the primary lesion in cases of metastatic gonorrhœa. Massage was the great stand-by in treatment. From sulfarsenol he had obtained no results, although he considered that the use of ichthyol internally was of value.

Dr. JAMES HUDSON (Newcastle-on-Tyne) spoke of the abuse of potassium permanganate in the treatment of chronic gonorrhœa. He had seen several cases in which the urethra had been damaged by too strong solutions. Sodium salicylate given by the mouth was useful as a preventive measure.

Dr. G. L. EASTES (London) said that vaccine therapy had received some hard knocks from previous speakers, but that a vaccine to be effective must be complete, and must comprise all the secondary organisms as well as the patient's own strain of gonococcus. In acute urethritis vaccines were, in his experience, of the very greatest use in effecting a cure without complications.

SECTION OF ANÆSTHETICS.

THURSDAY, JULY 26TH.

AT the opening meeting of the section, Dr. WILLIAM JOSEPH ESSERY, the President, welcomed the presence of colleagues from other districts, and hoped that the stimulating and thoughtful papers about to be read by the distinguished anæsthetists who had written them would be followed by fruitful discussion.

Dr. HAROLD SINGTON (London) read a paper on

Anæsthesia for Children.

The author divided his subject into four parts: (*a*) the consideration of the preparation of the patient; (*b*) the choice of the anæsthetic to be used; (*c*) a few points on the administration of the anæsthetic of choice; and (*d*) some suggestions for making the recovery as free from discomfort as possible. Under the first head he stressed the importance of refraining from drastic purgation, and the necessity for examining the patient's urine for acetone, which was often the result of sudden change from a very rich carbohydrate to a more mixed hospital diet. Operation must be postponed until the acetone had disappeared. In all cases glucose should be given before operation, as well as a preliminary injection of atropine. In a child of 2 years and upwards as much as 1/100 gr. could be safely given. On the other hand, morphine should be avoided in the case of children. As regards the second heading, ether was the anæsthetic of choice, except when the actual cautery was to be used, and in certain special operations such as dental extractions, where ethyl chloride was preferable. Gas and oxygen was the best anæsthetic in cases of congenital hypertrophic stenosis of the pylorus and of intussusception. Under the heading of the administration of the anæsthetic the author insisted that the anæsthetic of choice should be administered gently and persuasively. A few drops of essence of orange were sprinkled on gauze, and when the child had got used to the smell, ether was slowly dropped on until unconsciousness supervened, after which it could be pushed. The airway should be kept as clear as possible. Recovery could be made much less unpleasant if (1) a drop of ol. ricini were instilled into each eye after the cessation of anæsthesia, (2) the mouth were sponged out with normal saline solution, (3) a rectal sedative were administered, such as, in the case of a child of 10 years, potassium bromide 20 gr., aspirin 10 gr., dissolved in half a pint of normal saline solution.

Dr. A. L. FLEMMING (Bristol) read a paper on

Fatalities from Anæsthetics,

in which he elected to deal with his subject entirely from the clinical standpoint. For some years past the number of fatalities due to anæsthetics had remained practically stationary, despite an enormous increase in the number and severity of the operations performed. Patients were now expected to bear a surgical burden so heavy that without improved anæsthesia the mortality would undoubtedly have been much heavier than was the case. Deaths from anæsthetics might be classified according to what time they occurred during the administration—before, during, or after, operation. In the first group were fatalities caused by the anæsthetic without the intervention of other factors, such as shock, and a large proportion of these were associated with chloroform induction. Chloroform was too dangerous a drug for routine work. The second group was difficult to analyse, but coöperation between the surgeon and the anæsthetist was necessary to avoid overtaxing the patient. When a moribund patient died during operation it was misleading to attribute the death to the anæsthetic. In the third group it was almost impossible to fix the blame. Even post-anæsthetic pneumonia might be the result of tight bandaging and not of the anæsthetic. The surgeon might then call for a change of technique which, while reducing one risk, might induce another. Again, chloroform might be the safer anæsthetic to give to a bronchitic patient, even though there were greater risk during administration. The author brought his paper to a close by discussing some of the difficulties which seem to offer most hope of solution.

Dr. H. E. G. BOYLE (London) read a paper on

Anæsthesia by the Gas-oxygen-ethanesal and the Gas-oxygen-chloroform-ethanesal Combinations,

in which he pointed out that in these methods of anæsthesia attention must be paid to preliminary medication. To children under 14 atropine gr. 1/200 was given, and to those over that age morphine gr. 1/6 and atropine gr. 1/150. For adults of ordinary physique, Burroughs and Wellcome "hyoscine compound A" was ordered, while big strong men received the same firm's "hyoscine compound B." On the whole these preliminary injections gave the best results. The contents of the ether bottle had also to be varied with the patient and with the operation. For children no chloroform was necessary, but young adults and older people did best with a mixture of ethanesal and chloroform in equal parts. For diathermy or the cautery chloroform alone should be used. Nitrous oxide and oxygen being non-toxic, the use of these drugs reduced the amount of the toxic drugs used to a minimum, which was of obvious benefit to the patient. Induction was carried out by the gas and oxygen alone, and this was followed by the introduction of the gases into the ether bottle, so that the gases picked up the vapour of the toxic drugs and passed them on to the patient. When full anæsthesia had been secured the operation was commenced. As soon as the preliminary incision had been made the anæsthetic was continued by gas and oxygen only. The anæsthetist should keep a careful watch for all changes in colour, respiration, &c., and deal with each change appropriately as it occurred, giving more or less oxygen or more or less of the contents of the ether bottle as required. The airway must, of course, be kept free if necessary by an artificial airway. The author brought his paper to a close by referring to the method in the case of throat surgery and its application in operations where endotracheal anæsthesia was necessary.

Dr. CHRISTOPHER MAYHEW (Southsea) demonstrated his apparatus for the administration of warmed ether vapour, the chief advantages for which, he claimed, were its lightness and portability, the complete apparatus weighing only 1 lb., and the whole of it being carried inside its own warming cylinder.

Reviews and Notices of Books.

SURGICAL TREATMENT OF THE TONSILS.

The Tonsils—Faucial, Lingual, and Pharyngeal. With Some Account of the Posterior and Lateral Pharyngeal Nodules. Second edition. By HARRY A. BARNES, M.D., Instructor in Laryngology, Harvard Medical School. London: Henry Kimpton. 1923. Pp. 217. 25*s.*

Tonsillectomy by Means of the Alveolar Eminence of the Mandible and a Guillotine, with a Review of the Collateral Issues. By GREENFIELD SLUDER, M.D., Director of the Department of Rhinology, Laryngology, and Otology, Washington University School of Medicine. Same publishers. 1923. Pp. 176. 25*s.*

IT must be admitted that for many years the surgical treatment of the tonsils was conducted on unscientific lines, and that their surgical anatomy and pathology were inadequately studied and taught. Surgeons were content to treat recurrent tonsillitis by slicing off the prominent part of the gland with a sharp guillotine, and it was not until some 15 years ago that they began generally to realise that this operation was often insufficient and, indeed, frequently did more harm than good by causing stenosis of the crypts and favouring the retention of septic material. To ensure a complete removal of the tonsil with its capsule various methods of dissection were introduced, and, in 1910, Whillis and Pybus, of Newcastle-on-Tyne, and Sluder, of St. Louis, U.S.A., published methods of complete removal by means of a blunt guillotine introduced in a position opposite to that in which it had previously been used, that is, with the handle now directed towards the opposite side of the mouth. The two methods are not identical, for Sluder makes use of the "alveolar eminence" of the lower jaw to dislocate the tonsil through the fenestra of the instrument, while Whillis and Pybus employ the finger for the same purpose. The question of priority is, therefore, of small importance, but Dr. Sluder explains in his book on tonsillectomy that he presented his technique before the American Medical Association on June 9th, 1910, but that publication was delayed until March 25th, 1911; in the meanwhile Whillis and Pybus published their method in THE LANCET on Sept. 17th, 1910.

Dr. Sluder's book is written primarily to describe his method of tonsillectomy, and this he does in a most clear and thorough manner. He claims "perfect results"—i.e., complete removal—in 99·6 per cent. of cases; presumably he uses his method in all cases, but we think that in the hands of the average expert complete removal with the guillotine is less certain in some cases of adult tonsils adherent after quinsy and particularly in cases of tonsils which have been previously cut by tonsillotomy. This is by far the most valuable part of the book, and it has been expanded by a chapter on anatomy and embryology, and on the indications for tonsillectomy, and by a useful chapter by Dr. Arthur W. Proetz on physiology and general pathology. There is a final chapter on removal of adenoids by direct vision, by Dr. I. D. Kelley, the inventor of the method, which, though of interest, is somewhat out of place in this work.

Dr. Barnes's book on the tonsils is on similar lines, but of a more general scope. He describes at length the development, anatomy, function, and pathology of the tonsils, and the methods of tonsillectomy at present most in use, especially dissection and snare, and the Sluder method. Dr. Barnes himself does all his operations by the dissection method for the somewhat inadequate reason that a certain number of tonsils must be removed by dissection, and that he prefers to use only one technique. There is a good chapter on the sequelæ of operation, and the methods of dealing with hæmorrhage are well described, though Coakley's slip-knot ligature is not mentioned; and there is a final article on X ray and radium treatment of tonsillar hypertrophy, of which method his personal

experience is disappointing. The short chapter on neoplasms of the tonsil is inadequate. Both books are well produced and beautifully illustrated and should be valuable to the specialist.

LES CERCLES VICIEUX EN PATHOLOGIE.

By J. B. HURRY. Translated from the third English edition, revised and enlarged by C. FLANDIN and F. FRANÇON. Paris: Maloine and Sons. 1923. Pp. 354. Fr.20.

Dr. Hurry's well-known book on vicious circles in disease was first published in 1911 and the third edition was noticed not long ago in our columns. Its translation into French constitutes in reality a fourth edition, for the author has revised and amplified it for the purpose. It is right that such a suggestive piece of work should be so well received. The outstanding point on which the whole theme rests is that diseases are processes and not states—an axiom so elementary that it cannot be emphasised too often. And if the author's particular treatment of these processes lays more stress on the development of secondary disorders than on the attainment of compensations—if he seems to think of disease more as a thing which tends to go from bad to worse than as a series of which restoration and repair is one of the earliest items—it is only to indicate that nature or art may always break the circle and that art is more likely to do it if the existence of the circle is recognised.

PROBLEMS IN TUBERCULOSIS.

By Sir JAMES KINGSTON FOWLER, K.C.V.O., C.M.G., M.D., D.Sc. (Hon.), F.R.C.P., Consulting Physician and Emeritus Lecturer on Medicine, the Middlesex Hospital. London: Henry Frowde and Hodder and Stoughton. 1923. Pp. 64. 5s.

NOT infrequently the value of books is inversely proportional to their size. This book is small and also valuable. But its value lies not so much in the opinions it voices—some of them will not be widely accepted—as in the expression it gives to a general feeling that all is not well with the tuberculosis campaign in this country. A correspondent, writing to the author, pointed out that leaders do not appear to lead, that many workers have become discouraged and have withdrawn from the tuberculosis service, that tuberculosis schemes have but little life in them, that sanatorium physicians and patients have become disappointed and depressed, and that the tuberculosis movement lacks soul, aims, organisation, and financial means. This picture is obviously as true as it is gloomy, and in attempting to introduce some patches of bright colour into it, the author has earned the gratitude of many. By dedicating his book to Dr. Varrier-Jones he indicates as clearly as is possible the value he attaches to the Papworth system of treatment by tuberculosis colonies and settlements. But before he comes to this topic the author gives several chapters on such subjects as the prevalence of tuberculosis, infection, and diagnosis. The chapter on the tuberculosis dispensary is short and pithy; the author is well advised in urging medical officers of tuberculosis dispensaries to be more concerned with the discovery of "contacts" than with tuberculin medication. Tuberculin is, like hilum tuberculosis, one of the author's bugaboes; he expresses the hope, which is surely unduly optimistic, that when "the tuberculin man has at last seen the error of his ways the millennium will be in sight." In the chapter on the sanatorium the pertinent question is asked: "Why, in our industrial sanatoria, can we not 'cure consumption' as Brehmer at Görbersdorf and Walther at Nordrach did in private sanatoria, and as many others have done in this country?" Here the author has put his finger on a painful spot. He answers his own question: "One of the reasons is because no attempt has been made to establish a school for the training of the men who ultimately become directors of our public sanatoria." But if such a school were established, who could be found to train the trainers? The author is fortunate in his definition of the primary object of sanatorium treatment, which is "to fit the patient for the occupation in which he was engaged before the onset of his illness." In these few words he shows his distrust of the popular belief that by putting a puny bank-clerk on to the land he will almost automatically become a hardy son of toil. Other useful hints are given with regard to the improvement of sanatorium treatment, one of which is that there should be no time-limit for the duration of treatment in any given case. The chapter on the settlement is a plea for the Papworth system, for the author believes that the solution of some of the great difficulties of the tuberculosis problem lies in "the gradual transformation of the existing sanatoria into settlements on the lines which at Papworth have been shown to be practicable." It is safe to say that no one will agree with all that the author has to say, yet everyone will find much to learn in a book which is full of caustic wit.

PERFORATED ULCERS.

Les ulcères perforés de l'estomac et du duodénum. By H. MONDOR et G. LAURET. Paris: Masson et Cie. 1923. Pp. 186. Fr.10.

THIS monograph on perforated ulcers of the stomach and duodenum is a good account of the knowledge which has been accumulated to the present day on this subject. After reviewing the ætiology and pathological anatomy, the authors describe the clinical symptoms, laying great stress upon the problem of diagnosis. The most interesting section of the book to the practising surgeon is that which deals with treatment. The authors recognise three methods—namely, simple suture, suture plus gastro-jejunostomy, and resection of the stomach. Of these three methods they consider the most generally useful is the second. They are keenly alive to the drawbacks of combining any other operation with simple suture, but consider that on the whole the best results are obtained by adding a gastro-jejunostomy, especially as they recommend a wide infolding of the ulcer area. However, the relative merits of simple suture and suture with gastro-jejunostomy are well set forth, and from the statistics collected it is not possible to decide which is the safer procedure. As to resection, the authors think that it is too early to form any definite conclusion as to its advisability. They consider that in the hands of special operators it may be a method of choice.

CANCER: FALLACY, THEORY, AND FACT.

By JOHN SHAW, M.D. Lond. London: George Routledge and Sons, Ltd. 1923. Pp. 184.

IN this book Dr. Shaw makes "an earnest appeal to the honour of the medical profession throughout the world" to consider the treatment of cancer "without prejudice at whatever cost it may be to the immediate financial interests of the surgeon." The implication is that surgeons are tempted by greed to maintain a system of therapeutics which they do not believe in, or one, to put the position more pleasantly, whose defaults they are too ignorant to estimate. Dr. Shaw has collected a large number of figures in support of his theory that operation cannot be a rational treatment either of cancer or of precancerous growths. He is profoundly sceptical of the value of cancer research, and states that only one observation made by the Imperial Cancer Research Fund has been of practical aid to mankind—namely, that while cold does not destroy the vitality of the cells of mouse tumours moderate heat does. This observation he has utilised in the treatment of cancerous patients. Dr. Shaw's own thesis is to the effect that the secondary causes of death registered in patients succumbing to cancer are really the primary causes of the cancer, amongst them syphilis, alcoholism, gout, rheumatism, diabetes, Bright's disease, tubercle, and, above all, cardiac

insufficiency and other defects of the circulatory system. The diagnosis of cancer having been made by the surgeon, he would like the patient who is averse from operation to be allowed non-operative treatment at the hands of anyone he or she may select who shall have presented prima facie proof of having cured cancer without operation or after operation had failed. Dr. Shaw suggests himself as one who has presented such proof.

PALÆOPATHOLOGY.

The Antiquity of Disease. By R. L. MOODIE. Chicago: University Press. 1923. With 37 figures. Pp. 148. $1.50.

THE author has gathered together the little that is known about the pathological anatomy of fossil animals and adds to this some account of the pathology of primitive peoples. He ranges from healed fractures and an example of osteomyelitis in Permian reptiles to the calcified aorta of King Merneptah, which showed that his heart really was hardened, even if he was not drowned in the Red Sea. For the most part his evidence is derived from the enormous mass of vertebrate material which has been found in Wyoming and elsewhere, and, relating as it does almost exclusively to bones, the picture of ancient pathology which may be derived from it is necessarily very incomplete. The rôle of parasites is specially obscure. The occurrence of bacteria in Devonian strata seems to be well-established and they have been described even in pre-Cambrian rocks. They are to be found in some fossil bones as post-mortem invaders causing sometimes a certain amount of decomposition and structural alteration. In Permian and later reptiles their activities in causing inflammatory changes have been recognised. But if they were at these remote periods the cause of epidemics we can get no evidence to that effect beyond the finding of fossil tsetse flies in the oligocene of Colorado, which suggests that trypanosomes may have played a part in the evolution and succession of the early ungulates. In the last chapter, which deals with the early historic period, the author makes no use of the evidence other than anatomical which tells us something at any rate of epidemic disease, though readers will notice with interest the reproduction of cutaneous leishmaniasis on human faces on pre-Columbian jars in Peru.

The book is badly written, with much needless repetition; its format is in the nearly perfect style of the Science Series of the University of Chicago to which it belongs.

PHYSIOLOGY OF THE NERVOUS SYSTEM.

Methodik der Physiologie des Zentralnervensystems von Wirbeltieren. By WILHELM TRENDELENBURG, Tübingen. (Lfg. 104. Handbuch der Biologischen Arbeitsmethoden. Edited by Prof. E. ABDERHALDEN. Abt. V., Teil 5B, Heft 2.) Berlin: Urban and Schwarzenberg. 1923. Pp. 93 to 372.

THIS valuable article is apparently a new edition of one which appeared some years ago in Tigerstedt's "Handbuch der Physiologischen Methodik." It is brought fully up to date. Many of the contents are extremely technical and give, in great detail, the operative technique for experimental work on all parts of the central nervous system of all classes of vertebrates. This volume, like all the other parts of this stupendous publication which we have seen up to the present, will prove of great value to physiologists working or proposing to work on the subject with which it deals. The author's own knowledge of this special branch, in which he has earned world-wide reputation, is evidently immense, and the literature quoted leads us to think that he has omitted little or nothing of importance. The paper and printing are well up to pre-war standard with the exception of some of the half-tone blocks.

JOURNALS.

BRITISH JOURNAL OF SURGERY.—This journal now enters on its eleventh year, and we are glad to point out that it has been found possible with this number to return to pre-war conditions. The type has been improved, the pages increased to 200 in number, and we are informed that no opportunity will be lost to enhance still further the value of the contents. The present issue shows clearly the care and expense spent in its production, for the numerous and excellent illustrations are of a high order. In this forty-first number Sir D'Arcy Power continues his series of Eponyms, the subject being Pott's Disease of the Spine.—L. R. Braithwaite publishes his Arris and Gale lecture on the Flow of Lymph from the Ileo-Cæcal Angle. His work is based on experimental injections into cæcal lymph glands or the cæcal wall of animals and human beings of a pigment. He shows how the lymph stream from this area flows upwards to glands near the pylorus, and suggests that this has a bearing on the ætiology of gastric and duodenal ulcers.—M. J. Stewart and S. D. Lodge report the following renal abnormalities in 6500 consecutive autopsies, 14 horse-shoe kidneys, 1 unilateral fused kidney, 16 cases of congenital absence of one kidney, and 3 pelvic kidneys.—C. A. Joll discusses metastatic tumours of bone, analysing the nature of the primary growths, the bones affected, and the method of spread. He enters very fully into that most interesting of all bone metastases, those of thyroid origin, in which the gland itself is either normal or the seat of a benign growth.—A. P. Bertwhistle reports a case of depressed fracture over the angular gyrus, and its clinical and radiological localisation.—K. W. Montsarrat describes an operation for hæmorrhoids as practised successfully by himself for three years.—Hamilton Drummond records a case of retrograde intussusception of the small intestine into the stomach after a gastro-jejunostomy, and reviews the 11 cases recorded in the literature.—G. L. Keynes's Hunterian lecture on Chronic Mastitis is reproduced in full. In it he describes the normal structure and function of the breast, and seeks an adequate explanation of the changes found in chronic mastitis. Discarding all previous theories, and pointing out that in non-lactating breasts secretion must normally be balanced by re-absorption, he suggests that irritation due to stagnating secretions and epithelial debris may be the cause of those pathological conditions grouped under the head of chronic mastitis.—H. F. Macauley reports a case of a congenital ileo-cæcal cyst causing an intussusception in a child of six months.—Prof. S. G. Shattock has some illuminating pathological remarks about sarcomata of long bones. Amongst them is a suggestion for the safe removal of pieces of bone tumours for examination by means of a heated borer, the heat preventing malignant cells being grafted in the wound.—Prof. J. E. S. Frazer writes concerning the nomenclature of certain pathological conditions in the neck caused by the remains of vestigial structures. He points out that the terms "branchial" and "branchiogenetic" are inapplicable. He outlines the development of the pharynx and the cervical sinus, and shows that any cystic or fistulous condition in the neck is capable of accurate differentiation and recognition.—A visit to the clinic of Prof. Putti at the Istituto Ortopedico Rizzoli at Bologna is described.—R. Hamilton Russell describes a simple method of operating on femoral herniæ, which does not sound in the least convincing.—E. M. Woodman discusses malignant disease of the upper jaw. He emphasises that the area from which these growths arise is much more extensive than the superior maxilla proper, and, in fact, includes the whole of the air-cell area. He advises a very wide ablation of the affected parts, with no attempt at any plastic repair until all fear of local recurrence can be excluded.—H. P. W. White analyses the factors influencing the time of closure of suprapubic urinary fistulæ following suprapubic prostatectomy.—The following rare or obscure cases are reported: (1) A. G. Timbrell Fisher, a case of Acute Hæmorrhagic Pancreatitis twice in the same patient

with recovery; (2) L. R. Braithwaite, a case of Multiple Jejunal Diverticula; (3) C. Hamilton Whiteford, an Unusual Case of Death in Acute Appendicitis; (4) Douglas Drew, Perforation of Meckel's Diverticulum.

JOURNAL OF INDUSTRIAL HYGIENE.—July: Attention is drawn by D. C. Parmenter to the value of a health department to a mercantile business; instances are given. Each worker makes about ten visits a year to the department, and the visiting physicians see about 10 per cent. The cost works out at about $4 (18s.) per head. The financial benefits are not stated, except that in one case $3000 dollars were saved in one year in accident liability, about $2 a head, apart from other gains.—F. Koelsch discusses metal-fume fever and concludes that fumes of all heavy metals, such as copper, tin, lead, nickel, and mercury, as well as zinc, can cause the symptoms of brass-founder's ague. Zinc is the most usual metal concerned on account of its low boiling point, but if other metals are boiling their fumes cause similar effects.—An article of great interest to accident prevention is contributed by H. D. Kitson and C. Campbell; the authors show by striking diagrams an extremely close relation between the number of accidents and the number of new employees. They conclude that if the number of new employees could be reduced to zero the accidents would be reduced by 75 per cent. Hence efforts to reduce labour turnover and give more instruction to new workers are strongly advocated.—Danger from hydrocyanic acid gas arises in certain metallurgical and chemical operations, and in fumigating buildings, ships, and green-houses. S. H. Katz and E. S. Longfellow have developed convenient test papers for detecting the gas, which give estimations over a range of 25 to 1000 parts of the gas per million parts of air within 20 per cent. of those found by chemical analysis. Atmospheres containing 100 parts per million or over should be considered dangerous.——August: The main article, an important one, refers to carbon monoxide asphyxia and artificial respiration; it deals with laboratory research carried out by C. K. Drinker, K. R. Drinker, L. A. Shaw, and A. C. Redfield. They found that excessive artificial respiration by positive pressure apparatus does not harm the heart; but infected mucus, &c., may be carried into air-passages and set up broncho-pneumonia. While manual methods cannot be evaluated, the Schäfer method is probably more efficacious than is usually believed. A useful bibliography is given.—Next comes the final report of the Commission on Carbon Dioxide Asphyxia, in which the Schäfer method is recommended as against any positive pressure apparatus, which may do actual harm. The use of the new carbon-dioxide-oxygen inhalations developed by Henderson and Haggard is recommended as a specific remedy whenever available.—J. Fine reports upon the phagocytosis of lead compounds and their influence upon the activity of the leucocyte. He found metallic lead less readily phagocytised than basic lead carbonate; that soluble lead injures leucocytes and diminishes their ability to engulf carbon particles; that metallic lead has a similar but less pronounced effect; and that the rate of phagocytosis of metallic lead is of the same low order of magnitude as that of quartz.

Reports and Analytical Records.

BIRMO: SWISS NATURAL BITTER WATER.

(A. G. PLUSS, 9, NOEL-STREET, W. 1.)

THIS water is stated to occur naturally at Birmenstorf, Canton Aargau, Switzerland. When analysed the following results were obtained, expressed as grammes per litre:—

Sodium chloride ..	2·26	Calcium carbonate	0·6
Sodium sulphate ..	11·38	Silica	0·02
Magnesium sulphate	17·2		
			31·46

The water had a specific gravity of 1029·74 (water = 1000) and was very faintly alkaline in reaction. Birmo is an aperient water which has been known for the last 80 years. It is of the Hunyadi János type (THE LANCET, 1922, ii., 1284), but somewhat less concentrated. The magnesium sulphate is in excess of the sodium sulphate as the above figures show, whereas in Hunyadi János these constituents are present in equal amounts. Magnesium sulphate is one of the most powerful of the saline purgatives, its positive and negative ions both contributing to this result. It produces no irritation, as the increased peristalsis results from distension due to the presence of an increased quantity of fluid. Sodium sulphate is practically not absorbed, and it thus possesses the property of abstracting liquid from the tissues of the intestinal walls and acting as a saline cathartic. Saline cathartics, except under special conditions such as dropsy, are best given in dilute solutions as in the natural mineral waters.

IODINE MEDOL (ANTISEPTIC UNGUENTUM).

(PEARSON'S ANTISEPTIC CO., LTD., 61, MARK-LANE, E.C. 3.)

This preparation is claimed to be a non-toxic and non-irritant antiseptic ointment prepared from oxygenated hydrocarbon in combination with 1 per cent. iodine and 5 per cent. hycol. By the term "oxygenated hydrocarbon" presumably is meant the mixture of liquid paraffin and oleic acid referred to in the British Pharmaceutical Codex under the name "Parogenum." Hycol is a disinfectant of the creosote or cresol type. When analysed the preparation was found to contain 0·8 per cent. of iodine which is in fair agreement with the claim of the manufacturers. Iodine medol will no doubt be found useful as a means of applying iodine in a readily penetrable form in conjunction with an antiseptic.

PHLOGETAN.

(DICK COATES AND CO., 41, GREAT TOWER-STREET, LONDON, E.C. 3; J. T. ROBERTS, 23, PANMUIR-STREET, DUNDEE.)

Reference has been made in these columns on previous occasions to phlogetan therapy, and we have now received from the British agents of the Czecho-Slovakian laboratories samples of the latest method of preparation and evidence of the increasing interest taken by the medical profession in the drug. Phlogetan is a derivative of albuminoid bodies containing nucleo-protein, and is issued in hermetically sealed ampoules for intramuscular or subcutaneous injection. It was first brought to the attention of the medical public by Prof. Oskar Fischer, of Prague, who reported favourable results in tabes, since when the range of utility has been extended by other observers. There seems no doubt that good results have been obtained in association with the usual treatments for the condition, but the directions for administration, which are sent with the preparation, should be carefully followed.

VITANIUM.

(VITANIUM COMPANY, LINK HALL, SANDHURST, KENT. AGENTS: MAY, ROBERTS, AND CO., LTD., AND EDWARDS AND SON.)

We have received a sample of "Vitanium," a liquid stated to possess the property of converting caseinogen into a non-coagulable protein, thus making cow's milk more digestible to infants. The preparation consists of sodium saccharate with a trace of sodium albuminate, the action on caseinogen being one of hydrolysis. It has been specially recommended for adults who have found cow's milk indigestible or constipating, while they could readily digest milk which does not curdle. To prepare milk for the infant the instruction is, "Take half a pint of milk in the morning, add one teaspoonful of sugar, half a teaspoonful of Vitanium, and boil." In the case of Grade A milk boiling is not considered necessary. For adults one teaspoonful of Vitanium is added to each pint of milk and well stirred in. The preparation can be used for any age and for any length of time without harm.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 15, 1923.

HEADACHE.

AMONG minor nervous afflictions to which the flesh is heir headache enjoys an unenviable prominence. It belongs to a group of ailments the annoyance occasioned by which is not diminished because they may interfere but slightly with the working capacity of the individual. If some bouts do, in fact, lead to prostration, others receive no more notice than a casual comment that the sufferer is having "one of her headaches." Her headaches! There is scant sympathy in the possessive, as though headache were a thorn in the flesh planted by an inscrutable Providence, to be endured rather than cured. We may call it a minor affliction if we will, scarcely enough, sometimes, to arrest attention, still less compel investigation, but the dictum of BRISSAUD is in this respect peculiarly applicable: "rien ne serait moins scientifique que d'établir entre les problèmes médicaux une hiérarchie basée sur la gravité des symptômes; pronostic à part, il n'y a ni grandes ni petites maladies."

For all its banality, headache is a symptom the causation of which is frequently as obscure as its exact localisation is elusive. Last week in our own columns Mr. A. B. PAVEY-SMITH, of the Royal Bath Hospital, Harrogate, dissatisfied with what he has found in most books of reference, came forward with a classification of the "starting-point of the pain" into three main groups—viz., intracranial, cranial, and extracranial. This division, it should be understood, is not concerned with the diseases of which headache may be a symptom, but with the actual sites of the pain-causing lesion. How are these sites to be determined? The observer has at his disposal two criteria, the subjective and the objective—what the patient feels, and what the pathologist finds. He can, further, utilise the information furnished by the histologist as to the tissues in which sensory nerve-endings can be demonstrated, and by the physiologist as to the appropriate stimuli for the awakening of afferent impulses to the sensorium. Unfortunately it must frequently happen that he has to rely on the subjective data only, the pathological condition being uncertain and its localisation indeterminate. Further, it is clear, as indeed Mr. PAVEY-SMITH admits, that an intracranial change, giving rise to an "intracranial headache," may be brought about by extracranial lesions; disease may affect simultaneously more than one site wherein pain may originate; and in not a few instances the correlation of the pathological condition with the specific tissues in which is situated the presumed "lesion" causing the pain must be a matter of considerable difficulty. Mr. PAVEY-SMITH'S proposed classification is symptomatologically topographical but not ætiological, and in spite of its ingenuity not a little is purely speculative—a comment that might be passed on every classification since the era of Galen. The father of medicine, it may be recalled, believed the seat of the pain in headache might be (1) in the arteries and veins of the brain or in the meninges, (2) in the pericranium, and (3) in the temporal muscle—e.g., in hemicrania. He distinguished between internal and external headache, between pain situated in intracranial, and that in extracranial structures, and, according to DR. HARRY CAMPBELL, even claimed to diagnose one from the other. How much of his contention was a lucky guess and how much based on objective considerations it would be difficult for us now to determine.

We know, of course, that the pain of headache exists only in consciousness, and while we shall not attempt to "localise" the latter we may, for the sake of argument, assume that the appreciation of painful stimuli depends on the integrity of the sensory cortex. Whether, as a fact, it is at the thalamic or the cortical level that impulses of the physiological order are transformed into painful sensations of the psychical order is immaterial for the moment. Wherever the change, we do not suppose the sensation is there "localised" by the psychologist. Painful sensations are, however, "referred" by consciousness to such and such parts of the head; they appear with some sort of localising sign. This can rarely if ever be so definite as to enable the patient subjectively to refer the sensation to an intracranial, cranial, or extracranial seat; a purely topical localisation (frontal, vertical, occipital, &c.) may be accepted by the observer, but we should be somewhat sceptical of the nicety of introspection which would distinguish, for an instance, between bone and meninges, or between scalp and bone. We even are more tolerant of the symptomatological hyperboles of the neurasthenic, who declares he feels "as if his brains were being stirred about by a red-hot poker," than we are of any attempt on subjective grounds to differentiate dura from scalp as an algogenic centre. There are certain generalisations, derived from the statements of many headache victims who have been able to regard their infirmity in a detached way, beyond which it seems unwise to pass. Thus in migraine the headache appears to be largely extracranial, though Mr. PAVEY-SMITH, on the other hand, places the "starting-point" of the pain in the sensory cortex; similarly, in the variety known as nodular or indurative headache the individual concerned can usually locate the seat of the pain in extracranial structures. In cases in which the cephalalgia is accompanied by tenderness of the scalp an extracranial origin will be assumed, incorrect though this may be from the physiological viewpoint. In short, so little reliance can be placed on the subjective criterion that neither symptomatologically nor ætiologically can it furnish useful information.

The difficulty facing the clinician who depends solely on the findings of the pathologist is no less real. Headache associated with cerebral tumour, as an example, exhibits no constant relation to the site, size, or nature of the neoplasm. Has the headache of cerebral syphilis a meningeal, vascular, or parenchymatous "starting-point"? It is doubtless "intracranial," but more precision is desirable, if it can be attained. There is evidence apparently supporting the view of the insensibility of the cerebral cortex itself, but we are not sure that the stimuli hitherto applied are those to which it is physiologically capable of responding. Visceral pain, it would appear, is caused by the stretching of hollow viscera, but not by bruising or cutting. The dura probably reacts to stretching or distension; does its inflammation, per se, originate pain, or must the former or some other factor also come into play? Such questions will not be readily answered until a larger number of experimental data, preferably derived from observations on man, have accumulated. From quite another standpoint all cranial pain must originate in stimulation of the end-organs of the trigeminal nerve, or of the upper

two cervical dorsal roots, or, conceivably, of sympathetic afferents reaching sentient centres otherwise, and further localisation might seem otiose. Yet the "central pains" of thalamic lesions must not be forgotten, nor the topoalgia of hysteria and the "psychalgia" of other patients vaguely classed as "functional." The twin problems of the ætiology and localisation of headache call for much more examination, it will be seen, and Mr. PAVEY-SMITH'S contribution is a welcome addition to a difficult subject.

LABORATORY DIAGNOSIS OF SYPHILIS.

MANY workers in the field of pathology have endeavoured to simplify the original Wassermann technique with its five variable constituents. Some of these attempts have resulted in useful modifications, but on the whole the short cuts introduced for this purpose have resulted rather in a loss of accuracy than in any real saving of labour, or an increased simplicity in the performance of the test. As a consequence the unreliable results which not infrequently come from the hands of those who are attracted by the ease of such modifications as consist in relying upon the natural amboceptor or complement in the patients' serum have brought a certain amount of criticism upon this really trustworthy aid to clinical diagnosis. The precipitation test, first put upon a practical basis by SACHS and GEORGI, and which has been previously referred to in our columns,[1] differs essentially from these less reputable modifications of the Wassermann method in placing the reading of the test at an earlier stage, when a visible precipitate has been formed by the interaction of antigen and the patient's serum in positive cases—a precipitate which it is widely held exists in a less obvious form, and is detected by a biochemical method, in the Wassermann technique. A modification of this test was described in THE LANCET in 1921 by G. DREYER and H. K. WARD, and designated by them the Sigma Reaction[2]; this test has since been utilised by a number of workers with very satisfactory results. Recently a comparison of the results given by Prof. DREYER'S method with those obtained by the Wassermann test has been instituted by the Medical Research Council, who have embodied their findings in Special Report No. 78. In this publication are given the results of three independent sets of investigations: a special inquiry, undertaken on behalf of the Council by Prof. DREYER and Dr. WARD in collaboration with Prof. J. MCINTOSH and Dr. P. FILDES, and two further independent researches, on larger series of cases, carried out by Prof. ADRIAN STOKES and Dr. WIGHAM in Dublin, and by Drs. THOMAS HOUSTON, BOYD CAMPBELL, SMYTH, RANKIN, and HALL in Belfast. The results of these two latter inquiries have been previously made public and are reproduced in the present report. These three sets of investigations are thus complementary, although distinct from one another. If, however, we summarise their combined statistics we find that in all 3651 sera have been examined, and that in 3430 of these the results of the two tests are in agreement. There is therefore left a set of 321 cases, about 9 per cent. of the total, in which the results of the two tests differ. It should be noted in this connexion that in the Dublin figures, which constitute the largest series of the three and include 1515 cases, the percentage divergence is as low as four.

The general agreement of the two tests is therefore abundantly evident and needs no emphasising, but it is very necessary to examine as critically as possible the reasons for such divergences as exist and to estimate, as far as we can, which test speaks with the greater truth. The details of individual discrepancies can only be learned by laborious wading through some 100 pages of tabulated cases, but the clinician may take comfort from the fact that it is mainly in the borderline cases—early primaries, or treated syphilis, where the serum reactions are appearing or fading—that such discrepancies arise, and in these conditions difficulties in diagnosis are not usual. Prof. DREYER expresses his results in arbitrary units of his own invention, and considers anything over 1·5 units to indicate a positive result. The sigma test, like all serum tests for syphilis, is a quantitative one, a reaction of some degree being probably obtainable with most sera, but only appearing in a sufficient intensity to be readily perceptible by current methods in the case of serum from syphilitics, and it may well be that the figure of 1·5 is too low. If this be so many of the noted discrepancies will disappear and the agreement of the tests will be yet more striking. On the other important question as to which test is most likely to give accurate information in the few cases of undoubted active syphilis where discrepancies arise we have not sufficient information to dogmatise, but it is evident that sometimes the one and sometimes the other may give a true result—a finding which is occasionally seen where different Wassermann techniques are employed simultaneously to test the same serum. The decision as to which test to adopt is almost a personal one for individual pathologists. The flocculation test has the great advantage that it dispenses with three of the variable and unstable factors in the Wassermann reaction—hæmolysin, complement, and red cells—but as used by Prof. DREYER and his colleagues it is undoubtedly laborious and the use of drops as units of measurement is not likely to appeal to the majority of laboratory workers; it is, however, likely to be of especial use to the man who has a few tests to carry out or who does them at long intervals The Wassermann reaction at the present time is more rapid in performance and more easy to read—considerations which are of great importance in institutes where many tests are carried out each day. We think, however, that the precipitation test is capable of further simplification, and that in the not distant future it will probably replace the more complicated Wassermann. The whole gist of the results of many investigators upon the comparative values of these tests, which have been prosecuted now for three or four years, is that in the hands of a competent operator both are equally reliable as diagnostic aids to the practising physician.

[1] Münch. med. Wochens., 1919, lxvi., 440; and THE LANCET, 1921, ii., 799, 1322 (inter alia).
[2] THE LANCET, 1921, i., 956.

WHAT THE PUBLIC HEALTH SERVICE DOES FOR THE PUBLIC.

THE importance of education of the public as a means of improving the health of its constituent members is becoming more fully realised, and the advance in efforts to this end has been especially marked in recent years. The democratisation of government, both central and peripheral, and the fundamental fact that government now means control by elected persons who are non-experts, but who have or can have experts to advise them, necessitate enlightenment and persuasion of the general public if advance and reform are to be secured. Compulsion

can only succeed in compelling—except possibly for a short period and in exceptional circumstances—provided it has behind it the preponderant opinion of the public who may be liable to compulsion. Even then, as the experience of recent years has shown, a persistent though small minority may make a particular department of control impracticable; and we are obliged, therefore, to add the possibility of converting the minority into accord with the majority as an essential element of the application of compulsory measures. When this is secured compulsion merely means the organised expression of the will of the community. These considerations emphasise the importance of efforts for the enlightenment of the public in regard to public health work. In this respect our American friends have given us much valuable leading, and although occasionally measures of publicity in some areas have been extravagant enough to call forth caustic strictures from Dr. CHAS. V. CHAPIN, one of the greatest of American sanitarians, on the whole it can be said that great skill has been shown in convincing the public of the need of new departures and in persuading them to adopt them. This has been strikingly evident in recent successful efforts in several large cities to immunise a large proportion of the children against diphtheria. Of all measures for education of the public none is equal in permanent value to instruction of school-children, carried out on rational lines, and from that point of view we welcome the opportunity to quote in another column extracts from a recent series of draft articles sent to editors of public journals in the United States by the Acting Surgeon-General of the Federal Public Health Service, and intended to be read by scholars in upper grade and high schools. Similar efforts have been made on a small scale in this country, but none, so far as we are aware, are so systematic and complete as the one under review, and it is for this reason that we draw attention to the present example of wholesome propaganda.

HOSPITAL CONTRIBUTORY SCHEMES.

THE result of a questionnaire issued by the Voluntary Hospitals Commission as to the methods adopted in various areas to obtain contributions is, on the whole, disappointing. Particulars were received of 72 contributory schemes, affecting 102 hospitals, and a digest of the information available is now issued in a statement [1] for the benefit of local committees and the hospitals in their areas. It is disappointing mainly because the variety of local conditions, reflected in the variety of methods that have been adopted for working contributory schemes, is so great and the schemes in most cases of such recent origin and incomplete development that few lessons of general application are yet available.

Certain obvious points most schemes have in common—for example, reliance for contributions mainly upon deductions from wages. This can, of course, only be effected with the full consent of the wage-earners themselves and with the active coöperation of the employers or, in a few cases, of a voluntary collector at the works. In some instances the employers add a contribution of their own. The method of collection in a rural area presents considerable difficulty, special arrangements having to be made to reach the farmers. Applications and contributions forwarded through the post are not likely to lead to such good results as a scheme worked through group and village committees, the contributions being collected by a volunteer in every village. The collection of regular contributions from the "self employer" presents a special difficulty. They can be reached by a personal canvass in house-to-house collections, or by leaving a collecting book or box which is called for periodically. As to the amount of contributions, the sum payable each week varies from 1*d.* to 3*d.* a week on a fixed basis, or on some graded scale as 1*d.* in the £ of wages. In the simplest forms of contributory schemes the whole of the contributions are paid to the hospital and are allocated to meet maintenance expenditure. In a number of schemes, however, the hospital does not take the whole of the amount subscribed, but some allocation is made to other services—a percentage going, for example, to convalescent homes, nursing associations, and, in one instance, to dental services.

The inducement to be held out in order to attract contributors is a difficult feature in framing a contributory scheme. The majority of hospitals have been careful to avoid holding out any inducement that would bind them in a contractual obligation. There are very few instances in which anything approaching an insurance scheme has been attempted, but in one or two such cases the hospital authorities have guaranteed to all their contributors certain definite benefits. In one scheme the promoters have guaranteed free maintenance in any general hospital and in any convalescent home when required. In other cases the promoters have guaranteed immediate admission and free treatment for their contributors. In others the league or the association which works the contributory scheme guarantees to pay to the hospital a fixed sum per week in respect of each contributor treated. A certain number of schemes, without pledging themselves to the admission and free maintenance of contributors, provide as an inducement certain special benefits which are not available to non-contributors; these include convalescent treatment for the contributors and in some instances for their families, the benefit of specialist services for eye and ear cases and gynæcological cases, special orthopædic treatment, facilities for obtaining surgical appliances and spectacles at reduced fees, and assistance for dental treatment. A common form of inducement is the simple practice whereby contributors or their dependents when admitted are not asked, as are other patients, by the almoners to make a donation to the hospital. The majority of the hospitals, however, promise no special privileges, but rely upon the charitable instinct of the public, maintaining the principle that the necessitous poor and the medically urgent cases must have the first call upon the resources of the hospital. Subject to that, the contributors in practice get facilities for admission and in many instances are not asked to make any further donation to the hospital. It is noteworthy that of all the schemes examined only four have indicated that payments by patients have diminished as a result of the operation of such a scheme. Few schemes do not make some provision for representation of the work-people contributing on the governing body of hospitals, but the nature of such provision varies from representation on the board of governors only to eligibility for election to the committee of management and the house committee. For reasons which we indicated in commenting on the Sheffield scheme last week this question may ultimately be of extreme importance. The promoters of contributory schemes were invited to state in their replies to the questionnaire any special features which they considered to have contributed to the success of their scheme; the replies have not revealed any one dominant factor as ensuring success. This is not surprising, since the personality of those stimulating the work in any area is probably the weightiest factor and there are no scales whereby this may be compared.

Careful study of the report leaves the impression that the present schemes are transient in conception and execution, and that those who rely least on the detached charitable instincts of the public (which can still manifest itself on the old lines) and most on the sense of responsibility and local pride which it is possible to awaken in those who not only support but help to run their own hospitals, will ultimately prevail.

[1] V. H. Cmn. 10. H.M. Stationery Office. 3*d.*

Annotations.

"Ne quid nimis."

THE LONDON MEDICAL SCHOOLS.

WE have received note of formal opening ceremonies at four of the medical schools. The winter session at the Middlesex Hospital will open on Oct. 2nd at 3 P.M. at the Scala Theatre, Charlotte-street, W. 1, when Mr. Somerville Hastings will give an address on Team Work in Nature, and Princess Alice, Countess of Athlone, will distribute the prizes. The annual dinner will be held the same evening at 7.30 P.M. at the Trocadero Restaurant, Sir John Bland-Sutton presiding. St. George's Hospital Medical School will be opened on Monday, Oct. 1st, at 3 P.M., when Mr. E. B. Turner will deliver the inaugural address at the Medical School. King's College Hospital Medical School will have a formal opening on Wednesday, Oct. 3rd, at 2.30 P.M., when Mr. H. J. Waring, Vice-Chancellor of the University of London, will deliver the address, Lord Hambleden presiding. The annual dinner will be held the same evening, 7 for 7.30 P.M., at the Connaught Rooms, Great Queen-street, with Dr. Arthur Whitfield in the chair. Sir Humphry Rolleston will deliver the inaugural address at the opening of the London School of Medicine for Women on Oct. 1st at 3.30 P.M. We are informed that St. Bartholomew's, Guy's, St. Mary's, St. Thomas's, and University College Medical Schools are having no formal opening this year. St. Thomas's old students' dinner will take place on Oct. 26th, 7 for 7.30 P.M. at Princes' Restaurant, Piccadilly, Mr. W. H. Battle presiding. The annual dinner of past and present students of St. Mary's Hospital Medical School will be held at the Connaught Rooms on Oct. 1st, at 7 P.M., Mr. V. Warren Low presiding.

THE ORIGIN AND PREVENTION OF ANTHRAX.

ANTHRAX in its causation and prevention is essentially an occupational problem, at least in industrial countries. Study of its prevalence in Germany[1] during the past decade indicates how it originates and at the same time the lines which must be pursued to eradicate it.

Notified Cases of Anthrax.

Year.	Animals.	Human beings.
1912	6283	274
1913	6816	224
1918	1002	29
1919	743	18

Clearly the chief source of infection both for animals and man is raw material imported from abroad, the supply of which was largely cut off during the war. From 1910 to 1921, out of 1458 cases about one-half (746) occurred among those employed in agriculture, a higher proportion than occurs in this country. When the remaining cases are distributed among the three main industries concerned a great difference is found between Germany and Great Britain; the difference is due no doubt to the comparatively small woollen industry in Germany.

	Number of cases, 1910–21.	
Industry.	Germany.	Great Britain.
Hides and skins ..	538	198
Hair and bristles ..	113	60
Wool	4	443

Great Britain has already led the way in establishing a Government disinfecting station at Liverpool for dealing with infected wool. Germany has now to come to grips with her particular problem, the disinfection of imported hides and skins. Among tanyard workers the source of infection was traced in 335 cases, of which only 19 were due to home hides. Anthrax in home animals arises chiefly from infection carried on to pasture land by waste water from tanyards, so that disinfection of imported material would presumably eradicate the disease.

Three disinfecting processes are known[2]: (1) the Seymour-Jones process, in which the hides are treated with a solution of 0·02 per cent. chloride of mercury and 0·9 per cent. formic acid; (2) the pickling process, in which a solution of 1 to 2 per cent. hydrochloric acid and 10 per cent. sodium chloride is used at a temperature of 20° to 40° C.; and (3) the lye process, the basis of which is a 0·5 per cent. soda lye with 1 to 10 per cent. sodium chloride. The two last are considered better than the first; but each has its special advantages. Pickling takes place before liming and treated hides can be salted and kept. The lye process may be combined with liming or softening, but hides treated are unsuitable for keeping; hence while valuable at tanyards, it is not suited for separate disinfecting stations. The next important decision to be arrived at is whether disinfection, which has been proved to be practicable, should take place in stations at the principal ports of import or in the tanyards themselves. Dr. H. Leymann rather favours disinfection at the tanyard. Certainly all suspected wool on import can be more easily passed through our disinfection station at Liverpool than could hides and skins coming into Germany by a number of channels be directed through a few stations; expense and hindrance to commerce would be entailed, but more certain disinfection would be ensured.

[1] A Survey of Occupational Anthrax in Germany, International Labour Review, vol. viii., No. 2, August, 1923, pp. 269–278.

[2] Anthrax in the Tannery Industry. H. Leymann, International Labour Office, Geneva. Studies and Reports, Series F., No. 7, August, 1923. 1s.

LILLIPUTIAN TUBERCULIN DOSAGE.

IN *Paris Médical* for August 18th there is a paper by Prof. J. J. Viton, of Buenos Aires, who describes what he calls a novel method for diagnosing and treating tuberculosis with tuberculin. He has tested his theories for nine years and still writes of them with enthusiasm. As he points out, Koch attempted to diagnose tuberculosis by injecting a large enough dose of tuberculin to provoke a febrile reaction and other signs and symptoms indicative of a temporary exacerbation of the disease. Prof. Viton injects an infinitesimal quantity of tuberculin—he frankly calls it a fantastically small quantity—and instead of getting a temporary exacerbation or aggravation of the disease he achieves marked improvement in all, or almost all, the symptoms from which the patient was suffering. He takes Koch's undiluted tuberculin or a preparation resembling the tuberculin of Denys, and dilutes with a 0·25 per cent. aqueous solution of carbolic acid till he arrives at a dilution of 1 in 1,000,000. This is his starting-point or strongest dilution which he calls A. By repeating the dilutions he ultimately gets to a dilution of 1 in 1,000,000,000,000,000,000,000,000,000 and even higher dilutions, and he calls these dilutions B. C. D. . . . exhausting all the letters of the alphabet. When, in a case of pulmonary tuberculosis with tubercle bacilli in the sputum and signs of progress of the disease, with or without fever, an R. S. T. or higher dilution of tuberculin is injected, the fever, cough, and expectoration diminish, the patient sleeps and eats better, and his general condition is improved. This response occurs 10 to 15 hours after the injection of 0·25 c.cm. of the highly diluted tuberculin, and the beneficial response is of diagnostic as well as therapeutic value. Prof. Viton classifies his patients according as they are (1) tolerant, (2) sensitive, (3) very sensitive, or (4) hypersensitive. In the first class, suitable for dilutions A to F, are chronic or subacute cases of rheumatism of Poncet's type, neuralgia, neuritis, dyspepsia, and the like. In the second class, suitable for dilutions G to L, are early apyrexial forms of tuberculosis, including tuberculosis of the skin and cases of obscure dyspepsia. In the third class, suitable for dilutions M to R, are cases of early subfebrile tuberculosis, anæmia of obscure origin, and neuro-muscular asthenia. In the fourth class, suitable

for dilutions S to Z, are febrile cases of pulmonary and other forms of tuberculosis. If an unfavourable effect is obtained with a certain dilution, it is evidently too strong and a higher dilution must be tried. The good effects obtained with a high dilution last for a variable period, from 1 to 30 days or more. When the good effects begin to wear off an injection of a slightly stronger dilution is given, and the improvement which follows lasts as long as, and often longer than, that observed after the first injection. Prof. Viton does not say whether he has or has not carried out control tests with a 0·25 per cent. solution of carbolic acid alone.

THE LONDON CRIPPLES' FRIEND.

Sir William Treloar did not long survive his eightieth birthday when occasion was taken to celebrate the work on behalf of London crippled children to which he devoted his life. His last public appearance was at the Mansion House on Feb. 21st, when Lord Balfour handed him a substantial cheque for the Alton hospitals. We recalled on this occasion the fact that Treloar accepted the mayoralty in 1906–7 solely in his desire to help the children of the metropolis. Realising, as few laymen have realised, that a large proportion—Treloar himself put it at nine-tenths— of the crippledom of this country is caused by tuberculosis engendered by bad air, bad food, and slum surroundings, he vowed to establish a hospital for children crippled by tuberculosis and to collect for this purpose £60,000 during his mayoral year. The hospitals at Alton Park and Hayling Island which bear his name have put some thousands of children in the way of complete economic recovery, and have done more in setting a standard for similar treatment elsewhere. Of late years Treloar had lived principally at one or other of these hospitals in quiet enjoyment of the realisation of his youthful dreams. He will need no other monument.

EFFECTS OF A RESTRICTED DIET ON RATS.

SOME of the effects of a restricted diet have been studied by James Rollin Slonaker and Thomas A. Card.[1] Their studies have been continued over a period of eight years on rats, some of which were fed on a so-called vegetable diet, and others on a similar diet with the addition of a certain amount of animal protein—called an omnivorous diet. The effect on growth is of interest. The maximal weight of the males fed on the restricted diet was 35 per cent. less, and that of the females 25–28 per cent. less, than that of the corresponding control animals. The maximum weight was reached considerably earlier on the omnivorous diet. The duration of life was shorter on the restricted diet, but was prolonged when food containing animal protein was added to the diet. Moreover, the offspring of the rats fed on the restricted diet were less in weight than those of the controls—the newborn males being 18 per cent. and the females 14·5 per cent. less. The effects of the restricted diet became more and more pronounced until they reached the age of 250 days. The males were then 60 g., the females 25 g. behind the controls. The effects on pubescence and menopause were striking. In young rats the onset of sexual maturity was considerably delayed on a purely vegetable diet, as compared with normally nourished omnivorous animals, and this delay was the more evident the earlier the animals were fed on the vegetable diet, and the effect was more marked in the males than in the females. The period of menopause was not much delayed, but the period of sexual activity was shorter in those animals fed on the one kind of food. Moreover, on the restricted diet a considerable number of the animals remained sterile, and this was the case more frequently in the females than in the males. The longer the feeding on the one kind of food is continued the more marked were its effects. If to the vegetable diet animal food was added, the animals, as regards onset of sexual maturity, menopause, and duration of sexual activity, approach nearer these conditions in the normal animal, and the number of sterile animals was less. The effect on the number of litters and young born was also striking. On the purely vegetable diet a considerable number of the animals were impotent; their capacity for reproduction was less and disappeared in the third generation. Animals which were still capable of reproduction recovered on an omnivorous diet and manifested again almost normal relations. Of 70 pairs fed on omnivorous diet the number of litters was 3·28 per pair, the total number of young 15·7 per pair, and the number at each litter 4·77. The corresponding number in 69 pairs confined to a vegetable diet were 1·58, 7·8, and 4·68. The corresponding results on a number of pairs, where one parent was fed omnivorously and the other on a vegetable diet were 2·0, 8·82, and 4·41. If the parents and young alike were kept on vegetable diet the numbers were 1·82, 6·64, and 3·65, and in corresponding animals fed on the omnivorous diet the numbers were 2·64, 10·36, and 3·93. These effects on growth and sexual maturity of a reduction of animal protein in food are certainly noteworthy.

[1] Amer. Jour. of Physiology, vol. lxiii., No. 3, and vol. lxiv., No. 1, 1923.

INFANT MORTALITY FROM TUBERCULOSIS.

THE Registrar-General's annual review for 1921—a preliminary summary of which appears on p. 582—includes an important study of the course of the national death-rate from tuberculosis, to which special attention may be drawn. The study teems with difficulty, as there are known to have been changes in custom in certification and an important change in the classification of "hydrocephalus" which when not described as "acute," has since 1901 been excluded from tuberculosis. It appears, however, that if all changes in classification were eliminated the death-rate from tubercle of the nervous system (practically all tuberculous meningitis) in 1921 would be increased only from 0·70 to 0·92 per 1000 births, as compared with 3·03 in 1876–80. Tabes mesenterica, now rarely returned as a cause of death, up to 1901 was the commonest form of record for deaths from abdominal tubercle; and it is highly probable that a large share of the reduction in the death-rate from tubercle of the intestines and peritoneum—from 4·51 in 1876–80 to 0·45 in 1921—is due to the fact that in past years non-tuberculous conditions were often returned as tubercle. Tubercle of other sites has declined as a cause of death in the same period from 2·06 to 0·39 and of all sites in the aggregate from 9·29 to 1·54 per 1000 births. Valuable diagrams given in the report enable the course of events for quinquennial periods from 1861–65 to 1916–20 to be traced, and it is important to note the totally different courses followed by the mortalities from pulmonary and from non-pulmonary tuberculosis. The decreased death-rate from pulmonary tuberculosis has gone on for a long series of years, and since 1866 has occurred at a remarkably constant rate; whereas, the total rate from non-pulmonary tuberculosis is changed but little until after 1891 when a very rapid decline began. It appears highly probable that the explanation lies, as is suggested in this review, partially in the fact that with the greater sense of responsibility following on Koch's publication of the discovery of the tubercle bacillus in 1882, there was no balance of over-statement to be eliminated in the case of phthisis, whereas there was a large balance of overstatement in the case of non-pulmonary tuberculosis, both infantile and at all ages.

There would appear, however, to be a real decrease in infantile tuberculosis. For, as is pointed out in the review, infant mortality in general has declined enormously, and tubercle might be expected to have shared in this decline. There has also been increased protection of infants from exposure to infection by sputum, in connexion with institutional treatment of open cases of phthisis and otherwise. Furthermore, so far as tuberculous meningitis is concerned, if deaths

formerly attributed erroneously to this disease are no longer so attributed, we might expect increased mortality from "meningitis," but there has, on the contrary, been decreased registration of deaths under this heading. The general conclusion must be that the decline shown in the statistics has both fictitious and real constituents. The subject is one of great importance, as bearing on the estimation of success of anti-tuberculosis work. Events since the beginning of the present century are especially instructive; and there is reasonable ground for believing that infection of infants and young children with tubercle bacilli in massive dosage or of frequent occurrence is diminishing with the development of hygienic precautions and the general education of the public in connexion with the administrative control of tuberculosis.

THE DEVELOPMENT OF FILARIA RECONDITA.

BULLETIN No. 144[1] of the Agricultural Research Institute at Pusa contains observations on the morphology and life-cycle of *Filaria recondita* Grassi, by M. Anant Narayau Rao, assistant professor of agriculture in the Madras Veterinary College. The material on which these observations are based was obtained from the in-patients in the dog ward of the College Hospital. The microfilariæ or embryos are sheathless, 221–225 μ in length, with a breadth of $4\frac{1}{2}$–5μ, and in common with microfilariæ of other species they shoot out from the cephalic extremity a minute spine. An interesting point which the author ascertained, a character possessed in common with the embryos of *Filaria bancrofti*, is the habit of nocturnal periodicity. The embryos increased in number in the blood after 7 P.M., were swarming at midnight. Exposure to the sun or exercise reduces the few microfilariæ which can usually be found in the peripheral circulation during the daytime. At autopsy the largest numbers of microfilariæ are found in the lungs. Dogs that have died of this infection show characteristic pathological appearances—all the internal organs were anæmic, while the liver exhibited caseating areas surrounded by a zone of congestion; similar, but less intense, lesions were present in the spleen. The real interest of the paper lies in the fact that the author has traced the full development of this microfilaria in the thoracic muscles of *Culex fatigans*, while he has definitely shown that *Stegomyia* cannot serve as an intermediary host. The development follows that of *F. bancrofti* very closely and the mature larvæ can be demonstrated in the proboscis on the fifteenth day. They measured about 0·5 mm. in length. This work finally disposes of the suggestion of Grassi and Calandruccio that development may take place in various species of flea and tick.

SPONDYLOLISTHESIS.

THE skill, frequency, and financial success with which osteopaths are wont to reduce an imaginary dislocation of the spine are apt to blind us to the fact that there really is such a condition. Since Rokitansky in 1836 published an account of two cases of spondylolisthesis many such cases have been recorded, and by 1890 Neugebauer was able to collect as many as 101 cases from the literature. It is significant and humiliating to the medical profession that the correct diagnosis was made during life only in 47 of these cases; in the remainder the correct diagnosis was deferred to the post-mortem examination. Records such as these may tempt the osteopaths and other Philistines to scoff at this exhibition of orthodoxy, but it would be fair to point out that these mistakes belonged to the pre-Rontgen period, and it is comforting to note that all the 15 cases collected by Neugebauer some years later were diagnosed correctly during life. In *Norsk Magazin for Lægevidenskaben* for July Dr. Sofus Wideröe, one of the surgeons attached to the Communal Hospital of Christiania, has recorded two instructive cases of forward and downward displacement of the fifth lumbar vertebra in relation to the sacrum. In both cases complete recovery was effected by immobilisation of the affected parts by Hibb's bone-grafting operation which established bony union between the lowest lumbar vertebra and the sacrum. The first case was of special interest, as it clearly showed the mechanism of this dislocation and the diagnostic pitfalls it may dig. The patient was a girl aged 18, who, two years earlier, was indulging in horse-play with a strong boy standing behind her and arching her body forcibly backwards. She felt a sudden painful snap in the back and had to stop playing, but she was able to walk home. The next two years were passed in pain and invalidism; when she attempted to walk she was subject to attacks of violent pain in the back, making her collapse on the ground. Pott's disease was suspected, but a skiagram showed no sign of it. Treatment for two months by extension rid her temporarily of her pain, but after she had been symptom-free for about 11 months an attempt to return to office work provoked a relapse, and she went from one physician to another, being treated for rheumatism and other hypothetical complaints, and becoming steadily worse. On admission to Dr. Wideröe's hospital she showed definite lordosis of the lower lumbar spine, which became painful when she attempted to stand as straight as a recruit. A skiagram taken in the frontal plane revealed nothing of interest, but a skiagram taken from one side showed the fifth lumbar vertebra to be displaced forwards, the third lumbar vertebra forming an angle of 80° with the sacrum. The complete recovery effected by Hibb's operation in this and Dr. Wideröe's second case is well worth the notice of surgeons in charge of traumatic spinal cases with obscure symptoms and without the benefits of a skilled X ray examination.

THE RISKS OF THE MECCA PILGRIMAGE.

INTERESTING particulars are given in a recent report[1] of the measures taken to prevent the spread of cholera in Egypt. Before the war the pilgrims leaving Egypt averaged about 13,000 per annum; during the war the number was greatly reduced and now the size of the pilgrimage is gradually increasing. The numbers for the last five years have been: 1916, 1076; 1917, 281; 1918, 464; 1919, 444; 1920, 1657; and 1921, 2956. All the pilgrims were vaccinated against cholera before leaving Suez. The medical officer in charge reported that there were no facilities for hospitalisation of the pilgrims in the Hedjaz, in Jedda and Mecca and that his supply of drugs for the Egyptian pilgrims was exhausted, owing to the importunate demands of the notables of Mecca, before Jedda was reached on the return journey. In consequence the Egyptian Public Health Department is drawing up a scheme for a properly organised system of treatment and hospitalisation for its own pilgrims and hopes that the Governments of other countries from which pilgrims go will do likewise. No epidemics were reported from the Hedjaz during the 1921 pilgrimage. One returning Egyptian pilgrim was found to be suffering from cholera at the quarantine station at Tor. The Egyptian pilgrims were, as usual, carefully traced on their return to Egypt and those who showed any intestinal symptoms whatever had their stools bacteriologicallly examined. No further case of cholera occurred. During the pilgrimage a bacteriologist and a laboratory attendant are sent to the Suez laboratory to carry out the necessary examinations in connexion with returning pilgrims. Patrols are maintained in Sinai and on the Red Sea littoral to prevent Egyptian pilgrims returning by an unauthorised route to escape quarantine. The Sinai patrols intercepted 21 pilgrims. A regulation is in force prohibiting the entry into Egypt of returning non-Egyptian pilgrims, and difficulties arose in 1921

[1] Calcutta: Superintendent Government Printing, India. 1923. As.6.

[1] Report of the Ministry of the Interior on the Health of Egypt, 1921.

through other Governments having made no shipping arrangements for the return of their nationals to countries north of Suez. Obviously the whole of the precautions of the Egyptian Government with regard to Egyptian pilgrims will be of little avail if foreign returning pilgrims are allowed to trickle through the country uncontrolled. The Governments concerned should either provide direct sea transport or make financial provision for controlled land transport and repatriation of their own nationals. Medical control of a pilgrimage from each country of origin, on the lines of the existing Egyptian arrangements, would do much to reduce the present constant menace to the world's health.

THE PATHOLOGY OF LEGG'S DISEASE.

THE disease of the hip-joint associated with the names of Legg, Perthes, and Calvé has been recognised as a clinical entity since 1909, but its causation and pathology are still in doubt. The disease is not fatal, nor does it, as a rule, necessitate operative intervention, and therefore material for examination has been difficult to obtain. Histological examination of one case (Fründ) showed that the spongy tissue of the head of the femur was completely necrosed, while the cartilage remained intact and living. Prof. A. Nussbaum,[1] of Bonn, confirms this statement, and has produced exactly the same result in young dogs by division of the blood-vessels supplying the head of the femur. Microscopic examination revealed necrosis of the spongy tissue of the epiphysis, characterised by lack of staining of the nuclei of the bone cells in the marrow and cortex. The cartilage, on the other hand, remained in good condition, as shown by perfect staining of the nuclei and thickening of the cartilage, thus demonstrating that cartilage can live without its direct blood-supply, and must be nourished by the synovial fluid. In healthy well-nourished epiphyses the newly-formed cartilage is ossified by the endochondral type, and growth progresses evenly; but when the circulation is interfered with the columns of cartilage cells are no longer ossified by the ingrowing blood-vessels, but grow irregularly on top of the bone already formed, producing tongues and islands of cartilage dipping down into the spongy tissue. These tongues and islands correspond to the clear areas seen in the X ray. The diminished ossification of the cartilage explains its thickening, which is shown in the X ray by increase in the width of the joint cavity. Later, regeneration of the head takes place by new blood-vessels growing in with connective tissue developed from the synovial membrane. These experiments prove that Legg's disease is due to a primary necrosis of the head of the femur caused by an interference in the blood-supply, the cause of the latter being still unknown. Prof. Nussbaum suggests that the name the disease usually bears on the continent (osteochondritis coxæ juvenilis) is false, and should be replaced by necrosis capitis femoris.

ATMOSPHERIC POLLUTION.

THE eighth report of the Committee for the Investigation of Atmospheric Pollution provides much valuable information obtained from systematic analyses of impurity deposited from the air at about 30 experimental stations in different parts of the country. The first six reports appeared as supplements to THE LANCET; the present report covers observations for the year ended March 31st, 1922. As investigations on these lines have been carried out for a series of years it has been possible in the case of most stations to include in the report a comparison between the deposit collected during the current year and the average results of the past five years. In nearly all stations the quantities deposited during the year were below the average. Comparison between summer and winter deposits show that the summer total was less than the winter in 14, equal in three, and greater in five cases. From the records of Dr. J. S. Owens's automatic instrument figures showing the amount of suspended matter at each hour of the day and night have been prepared for London and Rochdale, and graphs of the average values over long periods indicate the remarkable parallelism between impurity and the periods of activity of domestic fires. Other curves showing the variation of pollution at three London stations on different days of the week bring out the effect of local smoke production on the state of the air. The effect of the coal strike of 1921 upon the maximum amount of suspended impurity in London air is shown in another figure. Experiments in Rochdale to ascertain what proportion of the impurity was produced locally and what was carried there by air currents show that only 15 per cent. of the matter deposited at the centre of the town was brought there by the wind. Dr. Owens's new portable instrument has proved of good use for the rapid collection of suspended atmospheric dust in a suitable form for examination and counting under the highest power of the microscope. Photomicrographs of some typical specimens of impurity magnified up to 2000 diameters are given in the report, and a useful bibliography of the measurement of dust by various methods is added. Special interest attaches to this report owing to the hope that the problem of atmospheric pollution is to receive serious consideration in Parliament in the near future. The Government are pledged to legislate upon the matter, and one of the proposals of the Bill introduced into the House of Lords by Lord Onslow on behalf of the Ministry of Health runs as follows:—

> "The powers of the urban authority . . . shall extend to the making of bye-laws requiring the provision in new buildings *other than private dwelling houses* of such arrangements for heating as are calculated to prevent or reduce the emission of smoke."

This Bill will come before Committee when the House of Lords reassembles in November, and, although it is an earnest of official interest, the measure as drafted falls short of what is regarded by some as essential. At present Government premises enjoy a complete immunity from prosecution as regards nuisances; they should be brought into line with other industrial concerns. Suggested concessions in favour of the iron and steel trades arouse misgiving, for clearly the Bill should retain such advantages as the present law possesses until replaced by something better. The report deals exclusively with measurement and makes no suggestions as to the mitigation of the smoke evil, which is a problem outside the sphere of the Advisory Committee. But exact measurement is an essential step towards improvement and the usefulness of the report cannot be questioned.

THE TRAINING OF MIDWIVES.

THE numbed bewilderment of a flock of prospective midwives being questioned by a member of the honorary staff on an official round has often excited the compassion of the more hardened medical students who may be present at the ordeal. The recommendation by Dr. Janet Campbell in her report on the Training of Midwives (H.M. Stationery Office, 1*s.* 3*d.*) that the minimum training period for unqualified women should be 12 months, and that for trained nurses should be extended from four to six months, will be welcomed by all who have watched these pitiful rounds. For untrained women, who have to gain practical experience of asepsis and antisepsis, as well as to grasp the principles of midwifery, to master in six months the present curriculum is obviously too heavy a task. The examination embraces 17 essential subjects, of which one alone, *the symptoms, mechanism, course, and management of natural labour*, must include a clear conception of the stages of one of the most elaborate physiological processes in the body, almost as puzzling to the clinical student as

[1] Deutsche medizinische Wochenschrift, June 29th, 1923.

were the folds of the peritoneum in his dissecting-room days. Dr. Campbell does not advise the extension of the time period without careful consideration of possible disadvantages, which she enumerates, but concludes that it is inevitable if higher standards of practice are to be expected. In considering the curriculum she notes that the nursing of puerperal women is often less efficient than it should be; in such concentrated training it is easy to neglect the unsensational routine of maternity nursing apart from actual delivery. Antenatal work has also been dealt with too lightly in the past; comparatively few midwives now in practice have had any useful training in this respect, and probably for this reason fail to make full use of the maternity welfare clinics. The feeding, care, nursing, and management of premature or diseased infants are special branches of her profession of which the midwife should also have practical experience. Unfortunately the colleague responsible for her training is not always really qualified to impart such complete equipment. To provide against this possibility, Dr. Campbell suggests the institution of a special certificate for teachers, not necessarily to eliminate the approval of practical midwives in this capacity, but to ensure that a teacher shall have the necessary degree of personal education and a knowledge of more recent developments of midwifery, as well as facilities and equipment for undertaking a 12 months' course of training. The majority of practising midwives, though competent and successful in their work, have not these qualifications; their teaching is still further limited by the possible susceptibilities of their patients, and they cannot afford to risk damaging their own practices by such methods as, for example, systematic antenatal supervision, which might annoy or alienate the women attended. The certificate for teachers would not imply any overstepping of the legitimate functions of a midwife and would, we consider, be an excellent step. Of more doubtful utility is Dr. Campbell's suggestion to register and thus recognise "handy-women." She does not propose that any qualification should be required for registration, but merely that suitable women engaged in maternity nursing should be accepted. Any unregistered woman found undertaking this work would then be liable to prosecution. The only requirements upon which it would be possible to insist in all cases are good character, personal cleanliness and physical fitness, temporary or permanent suspension from the register following proved unfitness in any of these respects. Dr. Campbell does not believe that registration would enhance the status of the handy-woman, but that the inconvenience of being subject to suspension by, say, the inspector of midwives, would act as a discouraging factor on her employment. We have some qualms, however, about her hopeful suggestion that difficulties would not arise over the inspection of unqualified women working directly under a doctor; nor do we anticipate that those fully trained monthly nurses who are not midwives would appreciate being enrolled in the same list as quite untrained women. It is not easy to see how best to relegate the handy-woman to her proper function of home-helper, but though the advantages of registration, as outlined by Dr. Campbell, are not inconsiderable, we do not think this proposal will meet with general approval. A section on the midwife and the public health service concludes an admirable report.

Dr. Andrew Balfour resigns on Oct. 31st his post as Director-in-Chief of the Wellcome Bureau of Scientific Research to take up other important duties. He will be succeeded by Dr. C. M. Wenyon, who for the past nine years has been Director of Tropical Research at the Bureau.

WE regret to announce the death, on Sept. 8th, of Mr. Gustavus Hartridge, ophthalmic surgeon to Westminster Hospital, and gratefully known to many generations of students for a lucid manual on the refraction of the eye.

Modern Technique in Treatment.

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XXXVI.

MENORRHAGIA IN YOUNG WOMEN WITHOUT GROSS LESION.

THE menstrual function is governed by internal metabolic changes of which hæmorrhage from the endometrium is but the outward and visible sign. The unseen and little understood metabolic processes naturally tend to be overlooked and the uterus, particularly its mucous lining, regarded as the organ at fault in menstrual disorder. It is curious that while amenorrhœa and scanty menstruation are accepted as due rather to general bodily states, such as malnutrition, anæmia, &c., excessive or painful menstruation is usually ascribed to deviation in the position of the uterus or disease in the endometrium, so that alteration of position and curetting have had an undue prominence in treatment.

It is essential in the first place to make sure of the precise nature of the trouble. Patients often seek advice because their normal habit is in excess of the average and, though perfectly well, think the loss is greater than it should be. Such patients require no treatment; it should be explained to them that their type is natural to them, although above the average in quantity or duration. On the other hand, definite change in the menstrual habit in the direction of excess is an indication of disturbance whether it causes symptoms or not, and the general health and circumstances of the patient call for investigation. If the menorrhagia is a symptom of organic disease, renal, cardio-vascular, or suchlike, the treatment will be that of the primary condition, but the vast majority of cases do not exhibit serious organic disease, and the most common provoking factors are those of a nervous and psychical origin or a change in the mode of life or occupation, as, for example, from a healthy outdoor life in the country to a sedentary occupation in town. Here treatment must consist chiefly in advice on how best to order the patient's present mode of life so as to remove the causes predisposing to her trouble. Unless this can be done no medicinal or other treatment will avail. The shop assistant or waitress on her feet all day in a stuffy atmosphere may obtain some benefit from physical exercise at her off times, if not too tired to enjoy it, from regulation of the bowels and other general hygienic measures, but unless she can continue at work through her periods she will not be able to keep her place. If the menorrhagia persists she must, at any rate for a time, give up work, when probably her natural habit will soon return. Ergot, calcium lactate, and the cotarnine salts are disappointing; generally the most valuable drugs are the bromides, but they are rarely successful unless the patient can rest at the time of the period. Improvement of the physical condition is essential, and the best possible use must be made of the intermenstrual period. The cases that respond most readily to hygienic treatment are those with excessive loss with normal intervals; the troublesome cases are those with shortened clear intervals.

Though less serious in its effects, the type in which a slight discharge—often termed "draining" or "dregs" by the patient—persists after the free loss has ceased is particularly difficult to treat; it is common in nervous women and causes them much mental distress. The continuance of a slight discharge should not be allowed to interfere with outdoor pursuits, and if once the patient can be persuaded to concentrate on her physical condition and not on her ailment, the likelihood of her recovery will be greatly increased. Curetting is rarely of use, but may be tried in those over the age of 25, in whom other measures have failed; the possibility of an intra-

uterine polypus or general endometrial hyperplasia makes one curetting worth while, but the factor producing the endometrial overgrowth, if not removed, will sooner or later cause a return of the condition. However, inasmuch as curetting affords an excuse for rest in bed, followed by a holiday, it may be the means of giving the patient a fresh start. Probably a judicious use of this time will do more than the operation itself.

The Endocrine Glands and Menstruation.

In spite of the extensive literature on organotherapy in menstrual disorders, our knowledge of endocrinology is as yet too fragmentary to admit of a rational basis for therapeutics; what is attempted is either empirical or speculative. Dr. H. Gardiner-Hill is now undertaking at St. Thomas's Hospital a study of the menstrual function in gross disorders of certain endocrine glands in the hope that it may lead to recognition of an endocrine factor in the less obvious cases. Apart from the ovaries, where abnormalities of function are difficult to assess, the endocrine glands chiefly associated with menstrual disorder are the thyroid and pituitary. Divergent views still exist as to the nature of this relationship and even as to the type of menstrual derangement likely to occur in gross disorders of these glands. The uncertainty arises partly from the difficulty of excluding abnormalities of other endocrine glands. The disordered menstruation accompanying gross disorders of the thyroid and pituitary glands may, indeed, be independent of a specific action of the hormones concerned, since profound alterations in the general metabolism are also produced. Both menorrhagia and amenorrhœa have been described as accompanying both hyper- and hypo-thyroidism. The general opinion seems to be that, while the majority of cases of Graves's disease show a tendency to diminished menstruation or amenorrhœa, if any irregularity at all is present, the majority of cases of hypothyroidism show a tendency to menorrhagia. The stage at which the condition arises, however, may be a factor of importance. The absence of the thyroid hormone in the cretin is generally held to be responsible for lack of development of the genitalia, and consequent amenorrhœa; if treated, however, the cretin appears to commence menstruation about the average age. Minor degrees of hypothyroidism, especially if the onset is in early adolescence, seem to give rise to early menstruation and a tendency to menorrhagia; at the onset of myxœdema in adults the menstrual tendency seems also to be in the direction of excess rather than deficiency. On the other hand, amenorrhœa is often stated to accompany myxœdema, possibly because myxœdema frequently arises at the time of the menopause, artificial or natural. An important relation undoubtedly exists between the pituitary gland and ovarian function, but how far pituitary disturbance can be a cause of menorrhagia is little known, except that in the early stages of acromegaly with anterior lobe hyperplasia overgrowth of the genitalia with menorrhagia occurs and is soon followed by the opposite phase of decreased sexuality and amenorrhœa.

In gross disturbance of the thyroid or pituitary gland menorrhagia is not usually the most prominent symptom. When, however, menorrhagia is a major symptom and gross thyroid or pituitary derangement not obvious, the possibility of some minor endocrine disturbance should be borne in mind, notably in cases occurring at the physiological epochs, such as puberty, after childbirth, or the menopause, especially if any toxic condition is superadded. If signs of endocrine disturbance are noted, an estimation of the basal metabolic rate provides a valuable indication of the existing state of function of the thyroid gland.

Abnormal conditions of the pituitary gland will usually be accompanied by disturbance of growth and metabolism. The patient's height and weight should be compared with the average normal for her age. Radiographs of the sella turcica should also be taken in doubtful cases, while estimations of sugar tolerance may provide additional evidence of pituitary disturbance.

Organotherapy.

The above factors must all be taken into consideration when considering the likelihood of success of organotherapeutic measures in menorrhagia. Up to the present three organic extracts have been chiefly used with varying results. These are thyroid extract, pituitary extract, and extracts of the corpus luteum. The empirical treatment of excessive, scanty, or absent menstruation by thyroid extract is sometimes followed by the return of normal menstruation, and at the climacteric by diminution of the general disturbances associated with this period of life. Thyroid extract is, however, a powerful stimulant to metabolism in general, and possibly these results are due to a general improvement in nutrition. Basal metabolism estimations would appear to provide the best guide as to the need for, and dosage of, thyroid extract in these cases. It should be tried in small doses, ¼ to ½ gr. at night to start with, and gradually increased as the indications arise. As to pituitary extract, the general opinion seems to be that results are disappointing, and when successful may be due to the well-known local action of pituitary extract on the uterine muscle. The recent work of W. E. Dixon suggests the likelihood of menorrhagia occurring with hyperactivity of the pituitary, and pituitary extracts have been recorded as producing good results in cases where ovarian function is deficient. Extracts of corpus luteum have also been used, chiefly by American observers, on the supposition that one function of the corpus luteum is the checking of the menstrual flow. Good results have occasionally been obtained, but apparently in menorrhagia during later, rather than earlier, menstrual life. Our knowledge of the properties of extracts of corpus luteum, however, is as yet meagre, and their administration is, to say the least, speculative.

Conclusion.

The treatment of these difficult cases may be summed up thus. Reliance must be placed chiefly on general and hygienic management of the patient, especially in regard to removing unfavourable conditions in her life and occupation and promoting good physique; curetting is of little use as a therapeutic measure, and more often required for diagnosis in patients after the age of 25–30 than in younger women. Drugs are rarely of use, except perhaps sedatives when there is nervous and psychical disturbance. The organic extracts are occasionally of use, but further investigation will be necessary before a scientific basis is obtained for their administration.

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Special Articles.

MEDICAL EXAMINATION OF DRUNKEN MOTOR DRIVERS.

WORKING OF THE NEW LAW IN DENMARK.

No one denies that the drunken motor driver is a dangerous nuisance. But to deal with him in a manner that is both effective and fair to all concerned is no easy matter. To fine him or lock him up for a month is often merely to temporise and put off the evil day—the second occasion when his tendency to get drunk may mean the death of one or more of his fellow beings. In this country we seem to be moving towards the rule that the motorist once convicted of drunkenness while driving must lose his licence for ever. This rule has already become law in Denmark, the law of 1918 having been revised in 1921 in such a way that, according to paragraph 34, the motorist convicted of drunkenness while driving may have his licence permanently withdrawn. Paragraphs 32 and 34 of this law of 1921 refer to two degrees of alcohol poisoning—"drunkenness" and "being under the influence of alcohol." As there is, of course, no hard-and-fast line between severe and slight intoxication, it soon became evident to the police in Denmark that, if the new law was to be administered justly and effectively, certain standards and criteria would have to be formulated, and soon after the law came into force they solicited the aid of the Danish Medico-Legal Council. An account of the correspondence which followed and of the practical outcome thereof has recently been given by Dr. J. Fog in *Ugeskrift for Laeger* for August 23rd.

In his letter to the Medico-Legal Council, the chief of police pointed out that the decision whether a motorist is drunk or sober has become a most serious matter since, in the former event, the motorist's career may be permanently terminated. It was therefore felt by the police that in cases of alleged drunkenness in drivers, a medical examination is essential. But the police felt it incumbent on them to point out that examinations for drunkenness by medical men had not been carried out in the past on a uniform system, nor had the wording of the reports of such examinations been invariably clear. Hence the difficulties which the police and legal authorities had had in acting on the reports of medical examiners. It was therefore hoped that the Medico-Legal Council would help to clear up this state of affairs and assist the police in choosing a medical expert who would be at the service of the police day and night. In answer to this appeal from the police, the Medico-Legal Council engaged the services of an alienist, Prof. A. Wimmer, and of a pharmacologist, Prof. J. C. Bock, to help work out a detailed scheme to be followed by a medical examiner called on to investigate an alleged case of drunkenness. In the reply of the Medico-Legal Council to the chief of police, it was pointed out that while definite tests could be devised for distinguishing between drunkenness and complete sobriety, the detection of the slighter degrees of alcohol poisoning was a matter of great difficulty. The Council's proposed tests referred therefore only to the diagnosis of definite drunkenness. These tests, it was pointed out, may be classed under three headings: (1) Chemical examination of the blood and urine; (2) psycho-physical examinations; (3) an ordinary clinical examination. In the case of the arrested motor driver, the Council came to the conclusion that only a clinical examination is necessary in practice, and the following programme was devised as a guide to the examining police surgeon, the scheme being sufficiently detailed for any doctor to carry out the examination to the satisfaction of the authorities.

1. Observe the driver's appearance. Drowsiness, drooping eyelids, relaxed features, congestion of the face and conjunctivæ, sweating, slobbering, disordered dress, and the like should be noticed.

2. Observe his behaviour. Noisiness, silly behaviour, excitation, garrulity, restlessness and other characteristics should be noticed.

3. Is his sense of time and space natural? If it is, say "Yes," if not, repeat his statements.

4. Test his memory. Note if he can remember a couple of addresses, and test his ability to describe something—i.e., how the motor accident happened, or the meaning of a drawing in an illustrated paper.

5. Note his speech; is it thick, nasal, lisping, or stammering? Let him repeat difficult words or read aloud a short notice in a paper.

6. Note his gait. Swaying and ataxia should be noticed, and Romberg's test should be carried out.

7. Test the movements of his hands and also his handwriting, telling him to write his name, age, station in life, and address on a sheet of paper.

8. Note if his pulse is regular and rapid, the condition of his pupils, and his response to painful stimuli.

9. Note if he smells of alcohol.

10. Are there signs of other diseases such as epilepsy and apoplexy?

Dr. Fog was charged with the task of putting this scheme into practice, and he has already examined 50 alleged cases of alcohol poisoning in motor drivers. The account he gives of these examinations shows what an elaborate process the Medico-Legal Council has devised. The average duration of a single examination is about 45 minutes. The medical examiner loses no time lest the condition in which he finds the driver should have changed since his arrest. The interview between the driver and the medical examiner is, as a rule, conducted in the absence of a third person, and the examiner hastens to assure the driver that he, the examiner, is a neutral, unbiased party, anxious only to find out the truth. In the quiet atmosphere of this tête-à-tête meeting, the driver, whose excitation is solely due to an accident and the events following it, soon settles down and carries out the various tests satisfactorily. On the other hand, the drunken driver who has been temporarily sobered by the shock of an accident and the prospect of losing his licence for ever, may at first pull himself together to pass certain tests. But the maintenance of such artificial sobriety for the better part of an hour is an almost impossible task, and if he is really drunk, the driver sooner or later betrays himself.

With regard to the value of the tests devised by the Medico-Legal Council, Dr. Fog has found that the fourth test is very delicate; none of the drivers classified as drunk, and hardly any classified as suffering from slight alcohol poisoning, could pass this test satisfactorily. But the fifth test, which also included sums in arithmetic, was of less value. Two drivers, who were found to be sober, could not pass simple arithmetical tests. Handwriting tests proved of little value, for the handwriting of comparatively uneducated men may be bad, however sober they are. As for the pulse-rate, it was of practically no value. Indeed, the average pulse-rate of the drivers discharged as sober was a little higher than that of the drivers declared drunk or suffering from slight alcohol poisoning. Test 9 was of value only when negative; merely to smell of alcohol is of little diagnostic value. All the three drivers not smelling of alcohol were discharged as sober.

Dr. Fog's classification of his 50 cases brings out some interesting points. All the drivers were men, and the age of 41 of them was between 20 and 39. There were 34 professional chauffeurs, and 16 amateur or private drivers. In as many as 34 cases an examination was required between 8 P.M. and 8 A.M., and in 19 of these cases an examination was required between midnight and 6 A.M. Only 9 of the 50 drivers were discharged as sober. Of the remainder, 11 were classified as drunk, and 30 as suffering from slight alcohol poisoning. It is evident from this interesting paper that, under conditions obtaining in Denmark, the medical examination of a motor driver accused of drunkenness is so elaborate and systematically carried out that there is little chance of a miscarriage of justice.

WHAT DOES THE PUBLIC HEALTH SERVICE DO FOR ME?

DISSEMINATION OF HEALTH INFORMATION IN U.S.A.

THE Federal Public Health Service of the United States of America has issued a series of leaflets intended to be read by the older scholars in upper grade and high schools. It has been prepared to meet the general demand for information in regard to the health work now being done by both National and State authorities. The discussion is in six parts, three being subdivided into two sections each, their average length being about 650 words each. The first part is introductory and its purport may be gathered from the extract below. In the second part we are told what the public health service does for the young, and the work of vaccination, of child welfare organisations, of school examinations, and the like, is described. In the third part precautionary measures in regard to travel are noted; in the fourth part we are informed how the public health service protects from communicable diseases. The fifth part deals with the solution of interstate health problems, including paragraphs on standardisation of special products. In the sixth part some portions of industrial hygiene are emphasised. The following extracts will serve to indicate the scope of the whole.

On the Dissemination of Knowledge.

Dissemination of health information is enormously important. Other countries, of course, disseminate it; but they do it chiefly for professional men, doctors, bacteriologists, and not until recently for the benefit of the "man of the street." The U.S. Public Health Service, on the other hand, addresses all the people. Some very technical publications are especially for the benefit of scientists, but by far the greater part of its publications deal with subjects that interest the everyday man, and with some that interest the everyday youth.

It disseminates information concerning new investigations, new discoveries, and new methods, by means of printed books, newspaper articles, radio broadcasts, public lectures, demonstrations, and school-children. Dissemination by children is very important; for when children learn a thing they can be relied upon to educate their parents.

The task of State health authorities, on the other hand, is to collect vital statistics (records of births, deaths, diseases, &c.); to prevent disease by vaccination, inoculation, and house quarantine of the sick; to supervise drinking water, milk, food, sewers, street sanitation, school sanitation, &c.; to inspect factories, workshops, &c.; and in some States to provide school nurses and school physicians.

Broadly spreading, the U.S. Public Health Service finds out things and the State and local health authorities apply them; though, of course, the State and local organisations find out a good many things and the Public Health Service applies a good many. Whichever way they work, however, they work together and get the maximum efficiency.

Foreign Quarantine.

Most important of the direct work for protection against disease is that of barring foreign diseases from our shores. This was almost the first duty undertaken by the Public Health Service, which was organised 125 years ago under the name of the Marine Hospital Service and charged with the medical and surgical care of merchant seamen. Owing to this duty it was usually the first to discover any disease brought from abroad. From this the Quarantine Service of the U.S. Public Health Service developed.

The States, of course, had control of their ports and at first most of them established their own quarantines. Later, however, it became evident that the National Government was best fitted for carrying out such work; and one after another the States turned over their stations to the Public Health Service. New York, the last, fell in line about two years ago.

Some years ago the quarantine work of the Service was divided into two parts—foreign and domestic. Foreign quarantine has to do with diseases coming from abroad and domestic quarantine with the spread of disease among the States.

The Public Health Service has two lines of defence against foreign diseases, one abroad and the other at home. In all, 77 officers man the first line, 31 in Europe, 2 in South America, 7 in Mexico, 3 in China, 19 in the Philippines and Hawaii, and 15 in Cuba, Porto Rico, the Virgin Islands, and Panama. These officers are stationed at as many sea ports, where they are charged with preventing the sailing for America of emigrants infected with diseases, especially with typhus, cholera, plague, and yellow fever.

In Europe the task has of late years not been easy. The would-be emigrants were mad to get to the United States; and their native countries were for the most part glad to have them go; and some of the steamships were not averse to carrying them, but were averse to spending money for delousing plants, &c. The Public Health Service could not directly compel them to do this, nor could it everywhere do it itself, for some European countries objected on the ground that in setting up the necessary facilities the United States was encroaching on their sovereignity.

The Public Health Service had to counter by requesting the State Department to instruct its consuls in Europe to refuse a bill of health to vessels sailing for the United States with passengers who had not been subjected to cleansing measures and by instructing its own quarantine officers to delouse immigrants on arrival in this country and to detain them, in case of suspicion, for 12 days thereafter. Only by this action were some steamship companies induced to instal disinfecting plants abroad. Aided by the present restrictive immigration law and by the disinfecting and delousing facilities, conditions are now reasonably satisfactory. The restrictive law is, however, until July 1st, 1924, only, and unless it is renewed or in some way replaced the tidal wave of immigrants waiting in Europe for the letting down of the bars will rush for this country at the first opportunity and the resulting pressure will test every timber in the health barricade.

Leprosy.

According to the best estimates there are now in the United States 500 to 1500 lepers, a mere bagatelle compared with those suffering from tuberculosis, which is for that matter far more contagious and far more deadly. Nevertheless, knowledge of the presence of a leper in a street car, for instance, would cause a panic and that of a tuberculous patient could cause scarcely a thrill.

Public opinion has insisted that the Federal Government shall take charge of all lepers, and it has undertaken to do so.

In 1917 Congress provided for a national home for lepers to be administered by the Public Health Service, but so strongly did the various States object to its location within their borders that it was not until four years later that the Service was able to acquire a leper home (in Louisiana). This home is still being enlarged, and each new ward is rapidly filled. The Public Health Service, on application from a proper State authority may accept as a patient at this home any leper found in any State, with the exception of aliens subject to deportation from the country. This protects you in steadily increasing measure against possible contact with lepers who are at large.

Leprosy has been found in a measure amenable to treatment. Nearly one-third of the patients at stations in Hawaii have been released as being no longer a menace to public health, and of these only about one-eighth have relapsed.

Examination of Biological Products.

Some years ago Congress assigned to the Treasury Department operating through Hygienic Laboratory of the Public Health Service the duty of making tests of "biological products" and of inspecting the factories where these "products" were manufactured. No bacteriological product may be shipped in interstate commerce not bearing the indorsement of the Laboratory. This indorsement is, of course, not as to the medicinal value of the product but is merely as to its strength, toxic properties, and the sanitary conditions under which it is manufactured.

Most States have officially adopted the Public Health Service standards; but some still allow the manufacture within their border of products whose manufacturers are unwilling to submit them for testing or their factories for inspection. Such products may not be shipped from State to State.

The Public Health Service has standardised products for use against diphtheria, lockjaw, dysentery, meningitis, pneumonia, and typhoid.

Within the last 20 years the death-rate from diseases now treated by bacteriological products has been enormously reduced. Small-pox, except where vaccination has been neglected, has been almost abolished; meningitis to about one-sixth and diphtheria to less than one-third; rabies, if taken in time, can almost always be prevented; tetanus has been greatly reduced.

Medical Departments in Industrial Plants.

The establishment of medical departments in most of the industrial plants of the country was also in part due to the Public Health Service. Such departments attend not only

to employees who are injured in accidents or who are taken sick at the plant, but they also investigate the causes of any disease that breaks out in the plant and eradicates it, thereby making the factory more healthful and reducing absenteeism and the cost of finding new men to replace those who quit. They keep records, too, from which the Public Health Service may work out, as soon as enough are available, a health standard based on the normal or average amount of absence from work on account of sickness. Such a standard is expected to bring about important improvements in factories that find themselves below par.

The effect on the physique and health of industrial workers, especially women, resulting from the monotonous and rapid repetition hour after hour and month after month of movements in themselves light and simple, is now being investigated.

The Public Health Service is of opinion that, so far, though conclusive proof is lacking, it is probable that serious injury may be caused by any work, the performance of which calls for cramped, constrained, or awkward posture. Less certain is the effect of such work on the nervous system. That the constant repetition of a movement does in time affect this system is more than probable, but how importantly it affects it has not been established. This investigation will almost certainly result in great benefits to working women.

VITAL STATISTICS FOR 1921.

THE REGISTRAR-GENERAL'S REVIEW.

THE text of this Review,[1] being one of three volumes comprising the entire survey, is now published one year and eight months after the termination of the year to which it relates, and many months after the publication of the tables which are necessary for complete study of the present volume. It contains the valuable, chiefly medical, commentary on the vital statistics for the year 1921.

A Phenomenally Low Death-rate.—As in the previous year (1920) there was experienced also in 1921 a lower death-rate than in any previous year since 1837, the main explanation of this being a succession of two exceptionally mild winters. Had the death-rate for 1921 been stated in terms of the standard population recommended by the International Statistical Institute it would have been 12·5 instead of 11·5 per 1000.

Comparison of the Two Sexes.—Much interest attaches to the relative mortality of the two sexes at various periods of life for equal numbers living. Reference to Table III. in another volume shows, as pointed out in this report, that prior to 1920 in no year was the death-rate at ages 85 and upwards higher in females than in males, as it was in 1921 (in the proportion of 100 to 95). At ages under 5 in the same year the male death-rate was 25 per cent., at ages 5–10 it was 3 per cent., at ages 15–45 it was 16 per cent., at ages 55–65 30 per cent., at ages 65–75 21 per cent., and at ages 75–85 14 per cent. higher in males than in females. There remains the age-period 10–15, in which male mortality was 3 per cent. lower than that of females, a phenomenon which, with few exceptions, has held good for many years.

Infant Mortality was at the rate of 83 per 1000 births, lower than in any previous year except 1920, when the deaths numbered only 80 per 1000 births. The hot dry summer of 1921 might have been expected to cause a large excess of diarrhœal diseases, but the amount of these diseases was well below the average of all years preceding 1915, though higher than in the more recent years preceding 1921. The valuable tables given on pages 6 and 7 of this Review are worthy of detailed study by all hygienists. They show, inter alia, the error of the commonly accepted statement that the death-rate in the first four weeks after birth has not declined. It was 40·6 in 1911 and 35·2 in 1921, and the variations in different localities were much greater than are indicated by these average rates for the whole country. In the next two months of infancy the death-rate between 1911 and 1921 declined from 24·7 to 14·7, in the third to the sixth month from 25·9 to 13·7, in the next three months from 20·6 to 9·7, and at 9–12 months from 17·4 to 7·8. In another table is shown the influence of urban life on infant mortality. In the first four weeks urban excess over rural was 7 per cent., in the next two months it was 25 per cent., in the third to the sixth month 49 per cent., and in the two next three-monthly periods 44 and 48 per cent. respectively.

The *Regional Distribution of Infant Mortality* has great importance. In the north of England as a whole it was 38 per cent. higher than in the south, an excess which is greater than the excess of infant mortality in county boroughs over that in aggregate rural districts. It is marked even in the first day after live birth (20 per cent.), and it amounts to 34 per cent. in the first four weeks after birth, and there is therefore opened up here a region for investigation by medical officers of health which should bear fruit, especially in improved care of mothers before, during, and after childbirth.

Deaths from Suffocation.—Up to the year 1914 accidental mechanical suffocation had varied little during 30 years. It declined rapidly in 1915 and 1916, and since then has fallen from 1·40 per 1000 births in 1914 to 0·59 in 1921. (To see the progress of events year by year it is necessary to refer to another volume.) Furthermore, while in past years mortality from this cause was much greater in the south than in the north, and especially excessive in London, the decreased mortality is not very unequal in all parts of the country. It is difficult, as is said in the report, to dissociate this change entirely from the war, and the decreased consumption of alcohol at once suggests itself as a possible explanation; though it appears not unlikely that some change may have taken place in the attitude of coroners to suspected cases investigated by them.

Increase of Excess Mortality of Male Infants.—As is well known, male infant mortality is always higher than female. Owing to the fact that comparing, for instance, 1881–90 with 1921 the male infant death-rate has declined only 45, while that for females has declined 48 per cent., the difference between the two sexes is slowly increasing. The excess in the mortality of males is greatest in the earlier months of infancy, and as the recent fall in infant mortality has occurred chiefly in the later months, this in itself explains some of the increased difference between the mortality in the two sexes. In this connexion it is necessary to think of early infant mortality as partly avoidable and partly inevitable, and if it be assumed, as is not unlikely, that a larger proportion of male than of female infantile deaths are in the latter category, it follows that reduction of infant mortality must be associated with an increased difference between male and female infant mortality. A comparison of the cause of events in other countries shows no movement in the opposite direction, although in only a few of the countries whose experience is quoted in the Review is there as large an increase in male excess as in this country.

(*To be continued.*)

[1] The Registrar-General's Review of England and Wales for the Year 1921. (New Annual Series, No. 1. Text.) H.M. Stationery Office. 5*s*.

ROYAL INSTITUTE OF PUBLIC HEALTH.—A course of lectures on Problems of Personal and Public Health will be delivered in the Lecture Hall of the Institute, 37, Russell-square, London, W.C., at 4 P.M. on Wednesdays, beginning on Oct. 17th. Among the lecturers will be Dr. Alfred Greenwood, Prof. J. C. Drummond, Major H. Graeme Anderson, Dr. W. A. Bullough, Mr. William B. Smith, Dr. C. W. Saleeby, Dr. Kate Platt, Dr. A. H. Bygott, and Mr. H. D. Herring.

The Harben Lectures will be given by Prof. C. Levaditi, M.D., of the Pasteur Institute, Paris, on Dec. 11th, 12th, and 13th on: (*a*) Neurotropic Virus (Encephalitis); (*b*) Neuro-vaccine; (*c*) New Discoveries in the Treatment and Prophylaxis of Syphilis.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

Health of Belfast.

THE report of Dr. H. W. Bailie, medical superintendent officer of health for the year 1922, has just been issued. The general improvement in the health of the city is shown by the fact that the total number of deaths in 1922, viz. 6304, with a population of 425,000, is less than the number, viz. 6910, in the year 1892, with a population of 261,046, the respective rates being 14·8 per 1000 and 26·5 per 1000. The rate for 1922 shows a fractional increase over the previous year—14·8 compared with 14·4 per 1000. Typhoid fever, which was formerly very prevalent, has almost disappeared. The number of cases was 75 with 7 deaths, a mortality of 9·3 per cent. No case of typhus fever occurred during the year. Scarlet fever was prevalent but in a very mild form. There were 741 cases with 12 deaths, a mortality of 1·6 per cent. Diphtheria was also prevalent. There were 497 cases with 43 deaths, a case mortality of 8·65 per cent. Measles caused 33 deaths, equivalent to a death-rate of 0·08 per 1000 of the population. Whooping-cough caused 16 deaths, equivalent to a death-rate of 0·04 per 1000 of the population. Diarrhœa caused 152 deaths, equivalent to a death-rate of 0·36 of the population; of the total number 127 were children under 2 years of age, and 25 were 2 years of age and upwards. There were 8 cases of cerebro-spinal fever with 3 deaths. Influenza caused 241 deaths. Phthisis caused 624 deaths, a rate of 1·5 per 1000. Pneumonia caused 594 deaths, a rate of 1·4 per 1000. Cancer caused 363 deaths, a rate of 0·9 per 1000. There was a reduction of 0·8 per 1000 in the death-rate from zymotic diseases, and an increase of 0·4 per 1000 from chest affections compared with the previous year. The birth-rate was 25·1, a decrease of 1·2 compared with the previous year. Infant mortality was 94 per 1000, or 21 per 1000 less than the previous year. The natural increase of the population was 4363. At the out-patient clinics for venereal disease 2376 cases were treated, and 420 patients received treatment as in-patients. The total cost of treatment of persons suffering from venereal diseases was £6544 5*s.* 8*d.*, of which 75 per cent. of the cost incurred was recouped to the corporation. The number of houses disinfected during the year was 1882. Five maternity and child welfare centres were in operation. The number of names upon the rolls was 24,287. Of 16,503 cows slaughtered during the year 35, or 0·21 per cent., exhibited lesions of disease in the udder; 12·33 per cent. of cows were found to be tuberculous.

Belfast District Asylum.

Dr. N. B. Graham's report for the year 1922 shows that the number of patients was 975, males 466, females 509. Discharged patients numbered 141, of whom 78 were cured. There were 74 deaths. Of these, 17·5 per cent. were due to general paralysis of the insane, 16·2 to phthisis, 14·8 to cerebral softening. As regards causation, the most potent factor was found to be a faulty heredity, the other chief causes being mental stress, critical periods, and syphilis. In only 2·6 per cent. of the admissions was alcoholic excess considered to be the principal cause of the insanity, but in 10·9 per cent. it was believed to be a contributory cause. A large increase in the accommodation for patients is in progress. Dr. Graham complains of the present state of the Lunacy Laws.

> "It is illegal to receive as 'voluntary' boarders early uncertifiable mentally afflicted patients, also certifiable harmless patients, who are willing to submit to such treatment, without certification. If the Lunacy Laws were amended to meet such conditions, the stigmata of certification, so much dreaded by patients and their relatives, would be removed; they would, therefore, be advised and encouraged to submit to such treatment, and so facilitate early recovery."

The Government of Northern Ireland may be expected shortly to deal with this important matter. It is a feature of the asylum, which is situated in a spacious park some miles from the city, to encourage work amongst the patients. About 60 per cent. of the patients are regularly employed, many of them in agricultural work, and this is found to be very beneficial. The asylum is on the villa system which has proved most satisfactory.

Tuberculosis in Belfast.

The annual report of Dr. A. Trimble, chief tuberculosis officer, shows that the death-rate from pulmonary tuberculosis for the year 1922 was 1·5 per 1000. This represents a reduction of 45 per cent. as compared with the year 1918, and a reduction of 68 per cent. as compared with the year 1890. A similar fall occurred in the death-rate from non-pulmonary forms of tuberculosis. The influence of housing is shown by the fact that in 62 per cent. of the new cases examined the conditions were reported as under average. The analysis of occupations shows the relatively large number of cases occurring in clerks, engineers, spinners, stitchers, reelers, winders, doffers, labourers. Discharged soldiers showed a high proportion. It is noteworthy in view of the staple trade of Belfast that flax-dressers and other branches of the trade showed a moderate ratio amongst males and a rather high ratio amongst females. The female rate in general continues to show a considerable excess over the male rate. In 42 per cent. of cases the patients were found to have had personal association with infected persons. The rate amongst new patients varied in the different wards of the city from 5·6 per 1000 of the population to 1·5 per 1000. The proportion of pulmonary, as compared with non-pulmonary cases, was 75 to 25. The open-air school for children living in contact with tuberculous cases has been attended with great success. Sanatorium, dispensary, and domiciliary treatment is pursued.

Public Health Services.

MENTAL HOSPITALS SERVICE.

NINE recently published reports of county and borough asylums[1] offer examples of certain changes which are slowly becoming general. The removal of adverse conditions produced by the war is evidenced by an improved state of general health in the patients and lower death-rates—in particular, deaths from tuberculosis and the numbers of active cases of this disease are both fortunately diminishing. Dysentery also appears to be less common, and several outbreaks of enteric fever recorded appear to have been traced promptly to their source and kept within very narrow limits. The improvement in the patients' health is attributable in part to a more liberal diet. Dinner appears to be a universally satisfactory meal, but the all too familiar and oft-repeated suggestion in the commissioner's report that breakfast and tea should be made less monotonous is still to be found in most of these publications.

Another change, exhibited in greatly varying degree, is a response to the demand for efficient medical treatment in cases of insanity. Visiting dentists are now almost universal, although in some cases their hours of attendance can only allow of treating the most flagrant cases of dental sepsis among the patients. Surgeons and other consultants have been appointed in some cases, and at Hill End (Hertfordshire) an operating theatre has been built, and at Nottingham a pathological laboratory.

The constitution of mental hospital staffs is not apparently sharing in the general trend of progress towards greater efficiency. The junior posts in this service remain ill-paid, and open only to bachelors, and the proportion of physicians to patients remains

[1] Annual Reports of the Brighton County Borough Mental Hospital, of the Kent County Mental Hospitals, of the Hertfordshire County Mental Hospital, of the Nottingham City Asylum, of the Monmouthshire Asylum, of the Joint Counties Mental Hospital, Carmarthen, of the West Sussex County Mental Hospital, of the Asylums Committee, City of Birmingham, and of the Down District Lunatic Asylum, Downpatrick.

in many cases undesirably low. At Barming Heath (Kent), for example, the post of second assistant medical officer is again vacant, as recorded in last year's report. At Chichester the post of third assistant medical officer is not only vacant, but intended by the committee to remain so indefinitely, one result of which, as pointed out by the commissioner, is that bacteriological and other laboratory work is at a complete standstill, and a well-equipped laboratory is unused. The most astonishing example of this policy (for it appears to represent an actual policy of staff reduction in some cases) is to be found at Carmarthen. Here the second assistant medical officer has had notice to terminate his services, and an institution containing nearly 600 patients is in future to be administered by the medical superintendent and one other medical officer. At the same time the number of nurses has been reduced, and their hours of service increased to 66 per week. To quote the commissioner's report:—

"How all the work is to be efficiently carried out, not forgetting the lectures for the nursing staff, and due relaxation is to be afforded it is difficult to see. I trust the question will be reconsidered, and that the committee may feel their way to abandoning this step, as well as the reduction of the nursing staff by 14 (and that contrary as it appears to the advice of the medical superintendent) at a time when so much is being said as to the necessity for, if possible, more systematic and individual treatment in mental disease. As to the reduction of the nursing staff, I will only point out that during my inspection to-day I noticed one female ward, number 5, with 27 chronic, noisy, troublesome cases, with but one nurse, the result, I was informed, of the reduction which has already taken place."

The only reference to these remarks in the report of the committee of visitors is a formal record of the visit, the authors of which have the effrontery to declare that the commissioner "reported that all the patients appeared to be in receipt of due supervision and care." The purpose of this painful euphemism is difficult to discern.

Nottingham and Hertfordshire have given leave of absence on trial to a number of cases, in some of which money allowances were made. The neglect of this procedure receives comment in other reports, notably in that of Carmarthen, where apparently no patients whatever were given such leave.

Chichester records a wonderfully low death-rate, of only 2·38 per cent. A small outbreak of enteric fever evokes comment on the methods of handling foul linen, which apparently "differ somewhat on the male and female sides." An interesting after-comment on the Committee of Inquiry into the Administration of Public Mental Hospitals is to be found in a paragraph referring to a late patient at Chichester who gave evidence at that inquiry: "A letter has recently been received from the ex-patient himself, retracting his allegations and apologising for the statements, which, he says, were made owing to a morbid mental state." It is unfortunate that this letter cannot be given wider publicity.

The reports of the Downpatrick and Birmingham asylums are of unusual interest, both for the readable material and full information which they provide, and the former particularly for its numerous photographic illustrations. Great changes have taken place at Birmingham. Rubery Hill and Hollymoor, until recently leased by the Ministry of Pensions, have been taken over again, and "no less than 810 patients have been transferred from institutions situated outside the city as far apart as York and Hampshire without accident." Great improvements have been made in the buildings, and their equipment now includes clinical laboratories, examination rooms, operating and dental room, hydrotherapeutic room, and research laboratories. These were referred to in reporting the inaugural ceremony of the Joint Board of Research in Mental Disease. A bridge which will shortly be complete will unite the Rubery and Hollymoor estates, and "provide about three miles of varied exercise track, with rustic seats in certain wooded spots." Perhaps the most arresting feature of this report is an exhaustive analysis, on original and up-to-date lines, of the ætiological factors assigned in the 147 direct admissions of the year. These observations deserve wider publicity.

One or two of the reports under review yield practically no information whatever beyond what can be found in their statistical tables. It still appears to be incumbent on some medical superintendents to record the condition of crops and cattle, and repairs to boilers or drains. Admittedly the state of the fabric of an asylum, and every sort of function performed by everyone connected with it, have some bearing on the patients' welfare, and should be under the medical superintendent's control, but why he should be called upon to describe such activities as these rather than discuss the mental welfare of his patients in a report which in any case is usually all too brief is difficult to understand.

SCHOOL MEDICAL SERVICE.

Hertfordshire.

The number of children inspected was 13,509, and the percentage with defects 32·1. Enlarged tonsils accounted for 5·8 per cent., enlargement of submaxillary and cervical glands 3·8 per cent., and malnutrition 1·3 per cent. Schools were closed on 181 occasions compared with 46 closures in 1921, the increase being due to influenza, colds, and measles. The four orthopædic centres of the Herts branch of the British Red Cross Society which were organised by Mr. R. C. Elmslie, orthopædic consultant to the London County Council, have been in full working order for one year, and the results obtained have been very satisfactory. Dr. Hyslop Thompson reports that the centres have supplied a long-felt want in the county, and the improvement in many cases is very marked. The following are the cases dealt with:—

—	MALES.			FEMALES.		
	Under 5 years.	Under 14 years.	Over 14 years.	Under 5 years.	Under 14 years.	Over 14 years.
Paralysis	9	18	3	6	12	3
Bone defects ..	14	7	1	15	9	1
Spinal curvatures	0	9	1	0	15	8
Joints	0	2	1	3	0	4
Injuries	0	5	10	1	4	8
Miscellaneous ..	6	12	6	8	13	14
Totals	29	53	22	33	53	38
Both sexes ..	62	106	60	—	—	—

Norfolk.

During the year 13,698 children were examined in the routine groups. In addition, 2111 special inspections were made and 8427 children were re-examined. About 1 per cent. suffered from malnutrition, and Dr. J. T. C. Nash refers the decline in the number of these cases as being eloquent of the better conditions for farm labourers prevailing during the past few years, but is dubious of the improvement being maintained owing to the recent fall in wages. Cleanliness has improved with the exception of certain families which will always be "impossible." Refraction clinics were held at 97 centres and four dental vans equipped for inspection and treatment are employed by four dentists, 78 per cent. of the 18,270 children seen being referred for treatment, and about one-third of these taking advantage of the authority's scheme. There were 2305 school children excluded from school under Article 45(B) for infectious disease, 148 of these for influenza.

Forty-seven children received institutional treatment for definite or suspected tuberculosis, seven of these being of the non-pulmonary type. In addition 79 children were under domiciliary treatment. At the end of the year there were 28 cases still in institutions and 75 under domiciliary treatment. Dr. Nash is of opinion that, although sanatorium treatment is expensive, money is well spent in preventing the onset of definite clinical tuberculosis, and he

considers that the nearer schools approach the open-air type the better, and suggests that less money might be spent on bricks and mortar and more on asphalted playgrounds, clothing, and food. "At the present time children, often poorly fed and inappropriately clothed, with defective footwear, have to sit for the best part of two hours in winter with cold, wet feet in rooms at a temperature under 50° F. in many schools. Is it to be wondered at that catarrh is common and that the children are too miserable to benefit fully from the instruction?"

One of the school dentists, Mr. Millican, contributes an interesting report on jaw deformities. He finds that children born and living on high sites or on the sea-front are freer from jaw or palatal deformity than children on low and damp sites, and he places the "locality" as the chief determining cause of jaw deformity.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdrs. R. H. St. B. E. Hughes to *Excellent*; F. G. H. R. Black to *Pembroke*, addl., for Chatham Dockyard, temp. Surg. Lt.-Comdrs. W. H. Sinclair-Loutit, R. Buddle, P. N. Button, W. J. Morris, J. F. Pace, J. F. M. Campbell, M. B. Macleod, and G. W. Woodhouse to *President*, addl., for five months' course of instruction at R.N. College, Greenwich. F. C. Wright to *Pembroke*, for Chatham Dockyard; and G. L. Ritchie to *Impregnable*. Surg.-Lt. R. W. Higgins to *Queen Elizabeth*.

ROYAL NAVAL VOLUNTEER RESERVE.

The following late Temp. Dental Surgs. have been transferred to the permanent list as Surg.-Lts.: T. P. Cooper, G. W. E. Holloway, A. G. D. Pridham, D. C. Lamond, E. G. Parkinson, G. R. D. Hankinson, and A. C. Bloomer.

ROYAL ARMY MEDICAL CORPS.

The undermentioned Cols., late R.A.M.C., retire on ret. pay: J. B. Anderson, on account of ill-health contracted on active service; R. J. Blackham from half pay.

The undermentioned Capts. are seconded for service with the Egyptian Army: D. C. Bowie, J. C. Collins, and J. J. Magner.

Temp. Capt. N. Leonard relinquishes his commission and retains the rank of Capt.

TERRITORIAL ARMY.

Capts. W. M. Wilson and E. W. Herrington having attained the age limit are retd. and retain the rank of Capt.

Lt. (Temp. Capt.) F. J. Cleminson relinquishes his commission and is granted the rank of Capt.

Capt. N. M. Fergusson to be Maj.

S. McC. Kirk to be Lt.

General Hospitals: Lt.-Col. Sir E. J. Maclean having attained the age limit is retd. and retains the rank of Lt.-Col.

The undermentioned relinquish their commissions and retain their rank, except where otherwise stated: Majs. E. C. Bevers and F. C. Pybus; Capts. H. M. Clarke, P. H. Green (granted the rank of Maj.), and J. A. Gunn.

Sanitary Companies: Capt. H. Duguid relinquishes his commission and retains the rank of Capt.

INDIAN MEDICAL SERVICE.

Majs. E. C. Hodgson, W. Gillitt, C. H. Barber, W. Tarr, H. Watts, I. D. Jones, W. T. Finlayson, W. T. McCowen, H. E. Stanger-Leathes, J. M. Holmes, and M. F. White to be Lt.-Cols.

The King has approved the admission of the following: J. H. Barrett, G. H. Fraser, and T. H. Thomas to be Capts.

Messrs. William Heinemann (Medical Books), Ltd. announce the early appearance of "High Blood Pressure: its Variations and Control," by Dr. J. F. Halls Dally; "Pneumonia," by the late Dr. Robert Murray Leslie, edited, revised, and brought up to date by Dr. J. Browning Alexander; and "Manual of Practical X Ray Work," third edition, by Dr. John Muir, B.Sc., in collaboration with Sir Archibald Douglas Reid.

Correspondence.

"Audi alteram partem."

BLOOD-DONORS.

To the Editor of THE LANCET.

SIR,—On the evening of Sept. 3rd a broadcast appeal for volunteers to act as blood-donors was sent out from King's College Hospital. The response was generous, the group-tests were done on the 4th, one suitable donor was selected, and the operation of transfusion arranged for the 5th. There the affair ends as far as the public is concerned. Expert criticism is disarmed by the statement that "the others have been classified for possible future emergencies."

One cannot help wondering how many of our hospitals find themselves in a similar state of unreadiness as regards blood-donors; nor can the reflection be avoided that in the majority this defect of organisation could be easily remedied. About six months ago, having need of a donor to give blood to a case of hæmatemesis (from gastric ulcer) I was fortunate enough to find at hand a known No. 4 volunteer; the transfusion was done at once, and the patient recovered. Realising that fortune is a fickle jade, I determined to make provision against a similar emergency, and to that end asked for volunteers amongst the employees of the Great Western Works, who number nearly 15,000, at Swindon. The response was generous; Dr. Knyvett Gordon came down and tested about 50 volunteers during one afternoon. At some convenient time in the near future another batch will be tested, but already, secure in the knowledge that at least a dozen No. 4 donors, of good physique and sound constitution are available at any moment, I have no anxiety now on this matter.

On two occasions since then I have been glad that this organisation existed, but the real criterion came on July 24th last when a man, aged 52, was struck by the flying fragment of a broken cutting tool in the left groin at the G.W.R. Works. Arterial blood cascaded from the deep wound inflicted. Two of his fellow workmen, trained in ambulance work, with commendable promptitude and efficiency controlled the femoral at the brim of the pelvis for 20 minutes, during which time, on an improvised operating table, and under ether, I was able to tie the external iliac artery. That being safely accomplished I enlarged the wound and tied the proximal and distal ends of the femoral and the severed profunda femoris. So far the account is not of special interest, and the replica could be furnished from hundreds of large works and hospitals. But as the last dressing was applied a workman approached me and asked, "Are you needing a No. 4 donor, because if you are, there is one ready waiting."

It is true that a large works offers ideal facilities, but there should be no insuperable difficulties in the way of applying the principle with varying degrees of perfection according to the conditions obtaining throughout the country. The factor of expense cannot be neglected. It is essential that the tests be made by a pathologist of experience; at the same time a Wassermann test can be done, and an adequate physical examination carried out. Every volunteer should receive a card stating his blood-group, and a record should be kept at the hospital of his address, &c. If the investigation be made of "batches" the expense is trifling. It is remotely possible that the Ministry of Health may consider the project worthy of consideration.

I am aware that efficient provision has been made for this contingency at certain hospitals; I have in mind, however, the organised registration of donors drawn from large works or other more or less stable communities. I am, Sir, yours faithfully,

H. H. GREENWOOD, B.S. Lond., F.R.C.S. Eng.,
Consulting Surgeon, G.W.R. Hospital; Hon. Surgeon, Victoria Hospital, Swindon.

Sept. 7th, 1923.

A MEDICAL AND NURSING SERVICE IN RURAL MANITOBA.

To the Editor of THE LANCET.

SIR,—I think your readers will be interested in a brief account of a combined medical and nursing service organised for rural areas by the Manitoba Division of the Canadian Red Cross Society, especially as it has been of tremendous assistance to many British-born settlers whose wives in many cases have come directly from the Old Land to live in what are known as the unorganised areas of Manitoba. It illustrates also the value of the whole-hearted coöperation of the medical profession with the Red Cross peace-time service.

In 1919 the Red Cross Society, finding a great and urgent demand for some sort of skilled assistance in dealing with the health of certain districts which had no other civilised social service, established at Reynolds, where Poles and Ruthenian settlers abound, 63 miles east of Winnipeg, Fisher Branch, 72 miles N.W. and Grahamdale, 134 miles N.W. (both points lying between Lakes Winnipeg and Manitoba), and also at Kinosota, 140 miles N.W., on the west side of Lake Manitoba, nursing stations, which were at first disciplined and managed by the Provincial Board of Health but now are under the exclusive management of the Red Cross Society with its Medical Advisory Board. These nursing stations proved of great value, but it soon became apparent that medical supervision was needed and that too great a responsibility was being placed on nurses whose calling does not include the ability to diagnose and to decide the final destination of any given case. It must be remembered that these districts, except Reynolds, were 40 miles at least from the nearest doctor and that very few of the people could afford to pay any fees. The problem was how to cover the ground effectively. For most of the year the roads are only passable by foot or horse-drawn vehicles, and not always thus. Bush country in unorganised Manitoba is always very boggy in spring and often in summer; in winter snow may block the trails. At the request of the Red Cross Society the Winnipeg Medical Society appointed an advisory committee of five doctors who had had a wide experience of rural conditions in Manitoba, under the chairmanship of one of the leading surgeons. After examining such propositions as the organisation of a travelling hospital the medical committee declared itself in favour of appointing a medical officer to the Unorganised Areas Service, who should be paid an ample salary with free transport, give full-time service without other remuneration, and make Winnipeg his headquarters, whence he should visit in turn or as occasion demands these or other nursing stations established by the Red Cross Service. This recommendation was adopted and financed entirely by the Red Cross Society, with the exception that the Winnipeg Medical Society presented the service with the necessary outfit of instruments for midwifery as well as for medical and surgical purposes. Since the fall of 1920 a succession of well-trained young medical men have manned this service to the great comfort and support of the nurses and to the relief of hundreds of settlers and their families.

Here I would like to emphasise the splendid services of our nurses, many of whom have been trained in the Old Country and have proved the value of their training for the C.M.B. diploma when handling the inevitable midwifery perforce single-handed and under difficult conditions. As an eloquent sample of the appreciation of this service to unorganised areas the following is a quotation from a recent letter to the present writer:—

"The Red Cross people have done a great work here. It is so comforting to us to have the nurse near us and the doctor's monthly visits. This spring the trails have been awful; the land is too wet to seed and now the meadows are too wet to cut the hay. Our post office is 3½ miles away but we have to go about seven miles to get there! Nurse has done fine work since she came here; has visited hundreds in all kinds of weather by land and lake; has been caught in storms and tumbled into snow-drifts, stuck in sloughs, and got lost on several occasions in happy ignorance of the danger! Few nurses would have gone through it, cold and hungry many a time, and no complaints, night and day. In fact she has had as many escapades as St. Paul!"

This is not exaggerated, and refers, of course, only to the unorganised parts of Manitoba. My committee consists of Dr. Jasper Halpenny (chairman), Drs. N. W. Warner, G. S. Fahrni, T. C. Brereton, and myself.—I am, Sir, yours faithfully,

H. M. SPEECHLY, M.R.C.S. Eng.,
Hon. Secretary, Medical Advisory Committee.

Winnipeg, August 22nd, 1923.

PATHOLOGICAL DEPARTMENTS.

To the Editor of THE LANCET.

SIR,—On this subject communications appeared last week in THE LANCET which call for comment.

The utilisation of university pathological departments for money-making may bring them into competition with the pathological departments of county hospitals in an unfair manner. This hospital, for instance, has a fully equipped pathological and bacteriological department with a specialist in charge, who is only allowed to practise as such and whose livelihood depends on this practice. There is a V.D. clinic in the hospital, a few yards from the laboratories, but bloods for Wassermanns *must* be sent to a distant university. The Ministry of Health refuses to allow the county council to pay the hospital department for Wassermann tests in spite of the representations of the county M.O.H., the County Public Health Committee, the clinic medical officers, and the medical and surgical staff of the hospital. The result is that the clinic bloods are "split" and with the hospital bloods (not "split") are done weekly as a matter of routine by the pathologist, who though unpaid, is not without honour in his own laboratory when reports differ. "Seeing the wheels go round" is preferred to a five-shillings-in-the-slot postal machine delivering a piece of pasteboard!

The position is the same in an adjoining county, and will no doubt be the same in a third county which is considering the appointment of a county pathologist.—I am, Sir, yours faithfully,

Salisbury, Sept. 10th, 1923. H. ST. ARNAUD AGATE.

DEFATTED BACTERIAL VACCINES.

To the Editor of THE LANCET.

SIR,—In a lecture delivered on June 14th at St. Mary's Hospital, Prof. G. Dreyer claimed to have made an important discovery by using defatted tubercle bacilli as antigen for diagnostic and therapeutic purposes in tuberculosis. This work has been enthusiastically received by the whole press, and may arouse hopes that will not be satisfied. The Institute of Microbiology in Saarbrücken has been working on very similar lines for years and the use of defatted tubercle bacilli has proved a delicate matter. I should therefore be very much obliged if you will allow me to indicate two things that will lead to a sober valuation of Prof. Dreyer's investigations.

In 1921 [1] and 1922 [2] I published experiments that demonstrated the necessity of defatting tubercle bacilli before using them as specific antigen. I described then a special method of defatting tubercle bacilli by means of the vapours of ether or other fat-dissolving liquid, and was able to show that in this process the biologic albumin of the bacilli remains intact and unaltered. The defatted tubercle bacilli form a stable emulsion that is specifically precipitated by the serum of tuberculous persons and this so-called "tuberculo-diagnosticum" is already in constant use at many sanatoria and by medical officers to schools. The same emulsion gave complement deviation when brought in contact with serum from

[1] Annales de l'Institut Pasteur, xxxv., 797.
[2] Deutsche Archiv für klinische Medizin, cxxxviii., 229.

tuberculous persons and showed remarkable effect when used as anti-tuberculous vaccine in men.[3] These facts have been fully confirmed by Wassermann,[4] who used another process of defatting the tubercle bacilli. Of the earlier publications recommending defatted tubercle bacillus as specific antigen, Prof. Dreyer's observations appear to be a confirmation.

The second and more remarkable point in Prof. Dreyer's lecture is the fact that his tuberculous antigen withstands exposure for four hours and more to 100° C., at which temperature tubercle bacilli must, according to him, be boiled with formalin and acetone if they are to lose their acid resistance.[5] Up till now bacteriologists have always carefully tried to avoid as much as possible any alteration of the antigen contained in the living microbe, the immunising power of which is demonstrated to us daily by practical experience. That Prof. Dreyer's boiled tuberculous antigen still possesses the same immunising power is a real discovery of highest theoretical importance, unless further investigation should prove that his good results are due rather to the effect of a protein than of a real immune-therapy.

I am, Sir, yours faithfully,

Saarbrücken, Sept. 4th, 1923. W. FORNET.

[3] Münchener Medizin. Wochenschr., May 11th, 1923.
[4] Deutsche Medizin. Wochenschr., March 9th, 1923.
[5] Brit. Jour. of Exp. Pathology, June, 1923, iv., 146.

Medical News.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—A fortnight's "Refresher" Course in general medicine and surgery will be given at the London Temperance Hospital in conjunction with Bethlem Royal Hospital, North-Western Fever Hospital, and the Royal Westminster Ophthalmic Hospital from Oct. 8th to 20th. The course will include daily lectures and clinical demonstrations in the wards and out-patient department. A course on genito-urinary diseases will be given at St. Peter's Hospital from Oct. 1st to 27th. In addition to demonstrations in the out-patient department a series of lectures will be given on various aspects by the members of the staff. A course of eight lectures on tropical diseases will be given by Dr. G. Low and Dr. P. Manson-Bahr at the School of Tropical Medicine, beginning on Tuesday, Oct. 2nd. The subjects considered will be the more important diseases of tropical countries. A course in laryngology, rhinology, and otology, consisting of clinical demonstrations, lectures, &c., each day from 9.30 A.M. to 5 P.M., will be given at the Central London Throat, Nose, and Ear Hospital from Oct. 8th to 26th. A further course on children's diseases will be given at the Victoria Hospital for Children from Oct. 8th to 20th, and in ophthalmology at the Royal London Ophthalmic Hospital from Oct. 8th to Nov. 3rd. The National Hospital for Diseases of the Heart and St. Mark's Hospital for Diseases of the Rectum will each give a fortnight's course on cardiology and proctology respectively, from Oct. 15th to 27th. Copies of the syllabus and further particulars regarding any of the above courses will be forwarded on application to the secretary to the Fellowship of Medicine at 1, Wimpole-street, London, W. 1.

LEBANON HOSPITAL.—Great Britain, America, Holland, and Switzerland all share in the work of the Lebanon Hospital for Mental Diseases, Asfuriyeh, Beyrout, Syria, and the report for the twelvemonth ended March 31st, 1923, shows that the institution has accomplished much good work. During the year under notice there were 279 patients under treatment including 181 new patients, of whom 132 were men and 49 women. Dr. H. Watson Smith, the medical director, states that the increase in the number of women patients necessitated the squeezing in of additional beds in the American and Philadelphia pavilions to accommodate them, and so resulted in an unavoidable congested condition of these houses. The opening of the Strawbridge Memorial House for women patients fortunately relieved this state of affairs. The general statistics show that 38 men and 18 women recovered, and that 49 men and 5 women benefited by their stay in the hospital, while 26 men and 7 women left the hospital for various reasons. The needs of the institution include a permanent and adequate water-supply at an estimated cost of £1000, an X ray plant at £500, a laundry at £1000, and a septic tank at £100. The address of the general secretary is at the Lebanon Hospital Office, 35, Queen Victoria-street, London, E.C.4.

ROYAL DENTAL HOSPITAL OF LONDON.—The prize distribution of the London School of Dental Surgery will take place at the hospital on Oct. 1st at 5 P.M., when Dr. Christopher Addison will distribute the prizes.

SMALL-POX IN ENGLAND AND WALES.—In the week ended Sept. 1st 21 cases of small-pox were reported in England and Wales, ten of these being from Gloucester. Three cases were reported in London on Sept. 7th, one each from Paddington, Finsbury, and Camberwell respectively, and in the five days following five further cases and two suspects came to light. The Camberwell patient was employed at a London hotel, and two cases in Westminster and Lewisham have been attributed to the same source. Infection in the others has been traced to a visitor recently arrived from Spain, whose indisposition was not recognised until the maid who attended her was found to be suffering from small-pox.

THE LATE DR. CLARENCE ROBINSON.—Dr. Robinson, who died suddenly at the early age of 42 on August 29th while on holiday in the Isle of Man, was a popular practitioner in Warrington. A native of Cork, he qualified L.R.C.P. & S. Irel. from Queen's College in 1903 and was appointed house surgeon at the General Hospital, Ramsgate, afterwards becoming visiting surgeon to the Ramsgate and St. Lawrence Dispensary. He went into partnership in general practice at Camberwell Green, and about 15 years ago migrated to Latchford, Warrington, where he became surgeon to the Warrington Infirmary, a member of the panel committee, and surgeon to the pensions board. In the early days of the war he worked at the Lord Derby War Hospital at Winwick, and afterwards served for five years at Thelwall Heys. He leaves a wife and two sons.

Medical Diary.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE, SPECIAL COURSE IN INFANTS' DISEASES, at the Infants Hospital, Vincent-square, Westminster, S.W.

MONDAY, Sept. 17th.—2–3.30 P.M., Dr. William Robinson: Congenital Heart. 4.30–6 P.M., Dr. Eric Pritchard: Premature Infants, Management and Feeding.
TUESDAY.—2–3.30 P.M., Dr. Eric Pritchard: Syphilis in Infants. 4.30–6 P.M., Mr. Philip Franklin: Tonsils and Adenoids. Demonstration and Operation
WEDNESDAY.—2.30–3.30 P.M., Dr. Helen Mackay: Special Cases in Wards and Out-patient Department (Diabetes and Insulin Treatment, Mongolism, Malaria, Enlarged Thymus, &c.). 4–6.30 P.M., Dr. Donald Paterson: Lecture: Encephalitis and Poliomyelitis.
THURSDAY.—2–3.30 P.M., Dr. Donald Paterson: Special Cases (Wind Swallowing). 4.30–6 P.M., Mr. M. S. Mayou: Lecture and Demonstration: Some Common Eye Conditions from the Practitioner's Point of View.
FRIDAY.—2–3.30 P.M., Dr. Eric Pritchard: Round Table Consultation. Special Cases for Diagnosis. 4.30–6 P.M., Dr. Donald Paterson: Summer Diarrhœa.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.

MONDAY, Sept. 17th.—10 A.M., Mr. Maingot: Surgical Pathology. 12 noon, Mr. Simmonds: Applied Anatomy. 2.30 P.M., Dr. Saunders: Medical Wards.
TUESDAY.—12 noon, Dr. Burrell: Chest Cases. 2 P.M., Mr. Banks-Davis: Throat, Nose, and Ear Department. 2.30 P.M., Dr. Pritchard: Medical Wards.
WEDNESDAY.—10 A.M., Dr. Saunders: Medical Diseases of Children. 2 P.M., Dr. Burnford: Medical Wards. 3 P.M., Dr. Pernet: Skin Department.
THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Department. 12 noon, Mr. Simmonds: Demonstration of Fractures. 2 P.M., Mr. Bishop Harman: Eye Department.
FRIDAY.—10 A.M., Mr. Dudley Buxton: Dental Department. 2 P.M., Dr. Burrell: Medical Out-patients. 2 P.M., Mr. Sinclair: Surgical Out-patients.
SATURDAY.—9.30 A.M., Dr. Burnford: Bacterial Therapy. 10 A.M., Dr. Saunders: Medical Diseases of Children. 10 A.M., Mr. Banks-Davis: Operations on Throat, Nose, and Ear.
Daily, 10 A.M. to 6 P.M., Saturdays 10 A.M. to 1 P.M., In-patients, Out-patients, Operations, Special Departments.

Appointments.

PANTING, L. C., M.D., B.Ch. Oxf., M.R.C.P. Lond., F.R.C.S. Eng., has been appointed Honorary Consulting Surgeon to the Helston and District Cottage Hospital.

ROBERTS, C., M.B., B.S. Lond., F.R.C.S. Eng., one of the Medical Referees under the Workmen's Compensation Act for County Court Circuits No. 5 and 8.

Certifying Surgeons under the Factory and Workshop Acts: MACKAY, W. M., M.B., Ch.B. Edin. (Crook, Co. Durham); FOXTON, H., M.B., Ch.B. Leeds (Uttoxeter).

Vacancies.

For further information refer to the advertisement columns.

Aberystwyth Infirmary, &c.—H.S. £200.
Aylesbury, Royal Bucks Hospital.—R.M.O. £200.
Barbados Parish of St. Andrews.—M.O. £300.
Benenden (Kent) National Sanatorium.—Res. Asst. M.O. £250.
Bradford Royal Infirmary.—H.S. £150.
Central London Ophthalmic Hospital, St. Pancras, W.C.—H.S. £100. Jun. H.S. £50. Also X Ray O.
Dover Royal Victoria Hospital.—H.S. £180.
Dreadnought Hospital, Greenwich.—H.S. and H.P. Each £150.
East African Medical Service.—M.O. £600.
Hackney Metropolitan Borough.—M.O. for Infant Welfare Centre.
Ipswich County Borough.—Sen. Asst. M.O.H., &c. £600.
London County Mental Hospital Service.—Seventh Asst. M.O. £432.
London Jewish Hospital, Stepney Green, E.—Hon. Asst. P., Hon. S. Also Asst. to Out-Patients. £100.
Manchester, Ancoats Hospital.—Res. M.O. £200. Med. Reg. £100.
Manchester Royal Hospital, Salford.—R.M.O. £200. Two H.S.'s and Cas. H.S. Each £150.
Manchester, Royal Infirmary.—Surgical Tutor. £30.
Middlesex Hospital, W.—Radium O. £300.
Mount Vernon Hospital for Diseases of the Chest, Northwood, Middlesex.—Asst. P.
Newcastle-on-Tyne Dispensary.—Hon. Phys.
Nottingham City Education Committee.—Jun. Asst. Med. Insp.
Prince of Wales's General Hospital, Tottenham, N.—H.S. £150. H.P. £150. Also J.H.S. and J.H.P. £110 each.
Queen's Hospital for Children, Hackney-road, E.—H.P. and Cas. H.S. £100.
Royal National Orthopædic Hospital, 234, Great Portland-street, W.—H.S. £150.
Royal Naval Medical Service.—Surgeon-Lieutenants.
Saint Pancras Dispensary, 39, Oakley-square, N.W.—Hon. S.
Walsall County Borough.—Asst. M.O.H. £650.
West African Medical Service.—M.O. £660.
West Bromwich and District Hospital.—Res. Asst. H.S. £180.
Wolverhampton and Staffordshire Hospital.—Res. M.O. £150.

Births, Marriages, and Deaths.

BIRTHS.

BURTON.—On Sept. 8th, to the wife of A. H. G. Burton, M.D., of 13, Beaufort-gardens, Ilford—a daughter.

GRAHAM-STEWART.—On Sept. 4th, at Northdown-avenue, Cliftonville, Margate, the wife of A. Graham-Stewart, M.B., Ch.B., of a son.

HUGHES.—On Sept. 6th, at Heylands, Chagford, Devon, the wife of Dr. H. Ll. Glyn Hughes, D.S.O., M.C., of a daughter.

STOKES.—On Sept. 4th, at Restholme, Cantelupe-road, Bexhill-on-Sea, the wife of Dr. Kenneth Stokes, of a daughter.

WARRICK.—On Sept. 1st, at Blackheath, the wife of R. W. Warrick, M.B., B.S., of a son.

MARRIAGES.

BAXTER—STOPS.—On Sept. 5th, at Emmanuel Church, Didsbury, Manchester, Stephen Edw. Baxter, M.R.C.S., L.R.C.P., to Ruth Jessica, second daughter of the late T. S. Stops, J.P., of Tiffield, Towcester, Northants.

BLAIR—HENDERSON.—On Sept. 5th, at St. Cuthbert's Church, Colinton, Edinburgh, R. G. Blair, M.C., M.B., to Nicolina Margaret, daughter of W. R. Henderson, of Chisholme, Roxburghshire, and Menld, Oxton, Cheshire, and Mrs. Henderson.

BROWNE—BOTT.—At Grange-in-Borrowdale, on Sept. 5th, Leonard Foster Browne, M.D., of 9, Harley-street, W., to Violet, fourth daughter of the Rev. Richard Bott, of Cotehill, near Carlisle.

MCCAUSLAND—SIMSON.—On Sept. 10th, in London, by special licence, Dr. Albert McCausland, of Swanage, to Miss Mildred Spicer Simson.

MCNEE—LE BAS.—On Sept. 4th, at the Chapel of the Charterhouse, London, John W. McNee, D.S.O., M.D., to Geraldine Z. L. Le Bas, only child of the late Cecil H. A. Le Bas and of Mrs. Le Bas, 20, Ridgmount-gardens, London.

ROBERTSON—BLACK.—On Sept. 1st, at Holy Trinity Church, Skirbeck, Boston, Dawson Cameron, M.B., Ch.B., to Ethel Freda Ogle, only daughter of Mr. and Mrs. Arthur Black, Burton House, Boston.

TRAVERS SMITH—IEVERS.—On August 4th, in London, Richard Travers Smith, M.D., F.R.C.P.I., of 17, Harcourt House, Cavendish-square, W. 1, to Ernesta Carlotta Nina, widow of James Butler Ievers, of Quinville Abbey, Quin, Co. Clare, younger daughter of the late Surgeon-General George Whitla, of The Drive, Hove, and Mrs. Whitla.

DEATHS.

HARTRIDGE.—On Sept. 8th, at Wimpole-street, W. 1, Gustavus Hartridge, F.R.C.S., aged 73 years.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

SOME BEARINGS OF ZOOLOGY ON HUMAN WELFARE.*

BY PROF. J. H. ASHWORTH, F.R.S.

THE bearings of zoology on human welfare—as illustrated by the relation of insects, protozoa, and helminths to the spread or causation of disease in man—have become increasingly evident in these later years.

Arthropods as Carriers of Disease.

At the time of the last meeting of the British Association in Liverpool, held in the year 1896, insects were suspected of acting as transmitters of certain pathogenic organisms to man, but these cases were few and in no single instance had the life cycle of the organism been worked out and the mode of its transmission from insect to man ascertained. Sir Patrick Manson, working in Amoy, had shown (1878) that the larvæ of *Filaria bancrofti* undergo growth and metamorphosis in mosquitoes, but the mode of transference of the metamorphosed larvæ was not determined until 1900. Nearly two years after our last meeting here the part played by the mosquito as host and transmitter of the parasite of malaria was made known by Ross. In addition to these two cases at least eight important examples can now be cited of arthropods proved to act as carriers of pathogenic organisms to man—e.g., Stegomyia—yellow fever, Phlebotomus—sandfly fever, tsetse-flies—sleeping sickness, Conorhinus—South American trypanosomiasis (Chagas's disease), Chrysops—*Filaria* (*Loa*) *loa*, the flea *Xenopsylla cheopis*—plague, the body louse—trench fever, relapsing fever, and typhus, and the tick Ornithodorus—African relapsing fever. In selecting examples for brief consideration I propose to deal very shortly with malaria, although it is the most important of the insect-carried diseases, because the essential relations between the Anopheles mosquito and the parasite are known to everyone here. There still remain lacunæ in our knowledge of the malarial organisms. Ross and Thomson (1910), working in this city, showed that asexual forms of the parasite tend to persist in small numbers between relapses, and suggested that infection is maintained by these asexual stages. Such explanation elucidates those cases in which relapses occur after short intervals, but the recurrence of the attacks of fever after long intervals can only be explained by assuming that the parasites lie dormant in the body—and we know neither in what part of the body nor in what stage or condition they persist. Nevertheless, the cardinal points about the organism are established, and preventive measures and methods of attack based on a knowledge of the habits and bionomics of Anopheles have been fruitful in beneficial results in many parts of the world.

Knowledge of the Methods of Disease Transmission.

If we desire an illustration of the vast difference to human well-being between knowing and not knowing how a disease-germ is transmitted to man, we may turn to the case of yellow fever. When this pestilence came from the unknown, and no one knew how to check it, its appearance in a community gave rise to extreme despair and in many cases was the signal for wholesale migration of those inhabitants who could leave the place. But with the discovery that Stegomyia was the transmitting agent all this was changed. The municipality or district took steps to organise its preventive defences against a now tangible enemy, and the successful issue of these efforts, with the consequent great saving of life and reduction of human suffering in the Southern United States, in Panama, in Havana, and in other places, is common knowledge. It is a striking fact that during 1922 Central America, the West Indies, and all but one country of South America were free from yellow fever, which has ravaged these regions for nearly two centuries. The campaign against Stegomyia is resulting, as a recent Rockefeller report points out, in yellow fever being restricted to rapidly diminishing isolated areas, and this disease seems to be one which by persistent effort can be brought completely under control.

Refinements of Entomological Research.

The relation of fleas to plague provides one of the best and most recent illustrations of the necessity for careful work on the systematics and on the structure and bionomics of insects concerned in carrying pathogenic organisms. Plague was introduced into Bombay in autumn 1896, and during the next two years extended over the greater part of Bombay Presidency and was carried to distant provinces.

* A section of the Presidential Address delivered to the Section of Zoology, British Association for the Advancement of Science, at the annual meeting in Liverpool on Sept. 13th.

The Indian Government requested that a Commission should be sent out to investigate the conditions. This Commission, which visited India in 1898–99, came to the conclusion (1901) that rats spread plague and that infection of man took place through the skin, but—and this is amazing to us at the present day—"that suctorial insects do not come under consideration in connexion with the spread of plague." Further observations, however, soon showed this conclusion to be erroneous. Liston found in Bombay in 1903 that the common rat-flea was *Pulex* (*Xenopsylla*) *cheopis*, that it was present in houses in which rats had died of plague and in which some of the residents had become infected, that the plague bacillus could multiply in the stomach of this flea, and that the flea would—in the absence of its usual host—attack man. These observations pointed to the importance of this flea in the dissemination of plague, and the Second Plague Commission, which was appointed and began work in 1905, definitely proved that *Xenopsylla cheopis* is the transmitter of the plague organism from rat to rat and from rat to man. The mechanism of transmission of the plague bacillus was worked out by Bacot and Martin in 1913. Subsequent research has shown that all fleas of the genus *Xenopsylla* living on rats are not of the one species. In plague areas it was found that *X. cheopis* was the common flea, while *X. astia* was the prevalent species in those districts which had remained free from plague or had suffered only lightly.

The distinction of *X. cheopis* from *X. astia* is not an entomological refinement with purely systematic significance, but corresponds with a different relation of the species to the epidemiology of plague, and hence becomes a factor of great practical importance. If through these researches it has become possible by examination of the rat-fleas of a locality to estimate accurately its liability to plague, anti-plague measures may henceforward be restricted to those areas in which plague is likely to occur—i.e., where *cheopis* is the predominant flea. Thus a great economy of effort and of expenditure and a higher degree of efficiency may be achieved; in fact, the problem of the prevention or reduction of plague may be brought from unwieldy to practicable proportions. When it is remembered that since we last met in Liverpool some 10½ millions of people have died in India from plague we have a more than sufficient index of the importance of a precise knowledge of the systematics, structure, and bionomics of the insect-carrier of *Bacillus pestis*.

Classification of Protozoa.

Another of the outstanding features of the period under review has been the extensive and intensive study of the Protozoa. The structure and the bionomics and life-history of these organisms have been investigated with the help of the finest developments of modern technique. It is fitting here to record our acknowledgement to two staining methods—Heidenhain's iron-hæmatoxylin and the Romanowsky stain (including Giemsa's and Leishman's modifications), which have added greatly to our technical resources.

There is time to refer only to certain of the Protozoa which directly affect man. Twenty years ago our knowledge of the few species of Protozoa recorded from the human alimentary canal was defective in two important respects—the systematic characters and the biology of the species—so there was much confusion. Subsequent investigations, and especially those of the last ten years (by Wenyon, Dobell, and others), have cleared up most of the doubtful points, but owing to the difficulties of size and the paucity of characters available it is by no means easy in practice to distinguish certain of the species. Of the 17 species now known to occur in the intestine of man *Entamœba histolytica* has received particular attention. This organism lives as a tissue parasite in the wall of the large intestine, where, as a rule, the damage caused is counterbalanced by the host's regenerative processes. But when the destruction outstrips the regeneration intestinal disturbance results, leading to the condition known as amœbic dysentery.

In all work with human Entamœbæ there is need for critical determination of the species, for, in addition to *E. histolytica*, a closely similar species, *E. coli*, is a common inhabitant of the intestine. This, however, is a harmless commensal, feeding on bacteria and fragments derived from the host's food. The distinction between the two species rests chiefly upon the characters of the nuclei and of the mature cyst—quadrinucleate in *histolytica* and octonucleate in *coli*—and considerable care and technical skill are requisite in many cases before a diagnosis can be given. And yet this distinction is definitely necessary in practice, for indiscriminate treatment of persons with Entamœbæ is indefensible; treatment is only for those with *histolytica*; it is useless for those with *coli*, and subjects them needlessly to an unpleasant experience.

A notable result of recent work is the proof that the more common intestinal protozoa, formerly believed to be restricted to warmer countries, occur indigenously in Britain. This was first established by a group of observers in this city, and has been confirmed and extended by subsequent workers. There is good reason for believing that in this country the incidence of infection with *E. histolytica* is about 7 to 10 per cent., and with *E. coli* about five times as great (Dobell).

Mode of Entry of Parasitic Worms.

Of the problems presented by the parasitic worms the most momentous are those associated with Ankylostoma and its near relative Necator, which are prevalent in countries lying between 36° N. and 30° S.—a zone which contains more than half the population of the earth. Heavy infection with Ankylostoma or with Necator produces severe anæmia, and reduces the host's physical and mental efficiency to a serious degree. Until 1898 there was no suggestion that infection was acquired in any other way than by the mouth, but in that year Looss published his first communication on the entry of the larvæ of Ankylostoma through the skin, and in 1903 gave an account of further experiments which proved that dermal infection resulted in the presence of worms in the intestine. At the meeting of this Association in Cambridge in 1904 Looss demonstrated to a small company his microscopical preparations showing the path of migration of the larvæ. His investigations served to establish the importance of the skin as the chief portal of entry of Ankylostoma, and pointed the way to effective methods of prevention against infection.

Another notable advance in helminthology is the working out of the life-cycle of Schistosoma (Bilharzia)—a genus of trematode worms causing much suffering in Egypt and elsewhere in Africa, as well as in Japan and other parts of the world. We owe chiefly to Leiper's work (1915–16) our knowledge of the life-history and method of entry into man of the Egyptian species of Schistosoma. He demonstrated that two species of this parasite occur in Egypt, and established that the miracidia develop in different intermediate hosts: those of *S. mansoni* enter Planorbis, while those of *S. hæmatobium* penetrate into Bullinus—the molluscs being abundant in the irrigation canals. The sporocysts produce cercariæ, which escape from the snails and gather near the surface of the water, and experiments with young mice and rats showed that the cercariæ attach themselves to the skin, enter, and reach the portal system, from which they travel to the veins of the lower part of the abdomen. Infection of man takes place chiefly through the skin when bathing or washing in water containing the cercariæ, though infection may also occur through drinking such water. And so, at last, these worms which have troubled Egypt for at least 30 centuries have become known in all their stages, and measures for preventing infection—which were of great use during the war—have been devised and curative treatment introduced.

The period under review has obviously been one of great activity in research on helminths, and fertile in measures tending to reduce the risks of infection. Insects, protozoa, and helminths not only inflict direct injury on man; they also diminish his material welfare by impairing the health or causing the death of his horses, cattle, and sheep, by destroying food crops during growth and, in the case of insects, by devouring the harvested grain. The measure of control which man can gain over insects, ticks, and endoparasitic organisms, will determine largely the extent to which he can use and develop the natural resources of the rich tropical and sub-tropical zone of the earth.

Other applications of zoology to human well-being cannot be dealt with owing to lack of time, but mention should be made of two—the researches on sea-fisheries problems which have formed an important branch of the zoological work of this country for 40 years, and the studies on genetics which made possible an explanation of the mode of inheritance of a particular blood group, and of some of the defects (e.g., colour-blindness and hæmophilia) and malformations which appear in the human race.

COLONIAL HEALTH REPORTS.

Sierra Leone.[1]

THE population of Sierra Leone at the census taken in 1921 was 85,163, of whom 44,142 dwelt in Freetown, the capital. The European resident population in the colony numbered 1161. The general health of both European and African officials compares rather unfavourably with that of the previous year. While the death-rates were lower, the invaliding and general sick-rates and ineffectiveness were higher; and though the total number of cases of illness treated showed a decrease of 5837 as compared with 1920, this is said to have been due to some extent to the closing of certain dispensaries. There was a mild outbreak of small-pox between April and June, 31 cases with one death, and an increase in malaria of 218 cases. Dysentery showed a marked decrease, from 404 cases in 1920 to 185 in 1921; it has almost disappeared from Freetown prison. Helminthic diseases are very prevalent, especially ankylostomiasis, of which

[1] Annual Medical and Sanitary Report, 1921. Freetown Government Printing Office. 1922.

there were 118 cases; eucalyptus oil appears to be efficacious in treatment, also thymol, or beta-naphthol, or both. The health of prisoners is stated to have been "most unsatisfactory" for part of the year: in the Freetown prison the sick-rate was 66·03, and the death-rate 78·66 per 1000 of average strength, the daily average number in custody being 318. Towards the end of the year, however, the health conditions improved, and dysentery became "almost negligible." Among the European troops in the colony there was not a single death; the chief cause of sickness was malaria (195 cases). Among the non-European troops venereal disease (179 cases) and malaria (66 cases) were the most prevalent affections.

The report states that it is difficult to get suitable men for the sanitary service, which is not popular. Progress was made in anti-malarial work at Freetown; "92,378 houses were inspected, resulting in the discovery of 483 breeding places." As the population of the town is stated as 44,142, it is to be presumed that this means "house-inspections," not individual houses. Oiling of cesspits was carried out, and a mixture of kerosene and "solido disinfectant fluid" was found to be very useful; the two fluids mix well, and fly breeding is prevented as well as that of mosquitoes. A slight outbreak of small-pox occurred in Freetown (26 cases); this was probably due to introduction of infection from Grand Bassa (Liberia). Vaccination does not appear to be satisfactory. In the colony there were 35,989 children vaccinated during the year; in 10,917 the operation was successful, in 6794 unsuccessful, but 18,278 other children were not inspected; even in Freetown, out of a total of 14,708 there were 9653 not inspected. When small-pox became epidemic in Freetown Police District vaccination was made compulsory. There has been a great reduction in the prevalence of dysentery; only 184 cases were treated in Government institutions in 1921, as compared with 394 in 1920, and 574 in 1918. On account of the prevalence of intestinal disorders in Freetown an extensive examination of tinned foodstuffs was carried out, with the result that several thousands of articles were destroyed by order of the magistrate, including 5764 tins of sardines and 132 barrels of biscuits. It is disquieting to hear that there was a scarcity of water at Freetown from the middle of March to the middle of May, and that the city was placed on a restricted supply. "The problem of further increasing the water-supply will sooner or later have to be faced and seriously grappled with." To an outside observer it would appear to be a matter requiring immediate action. The average maximum temperature at Tower Hill, Freetown, was 91° F. in February and March, and 90° in January and April; in January and February no rain fell at all, and in March only 0·11 inch. A restricted supply under such conditions would entail hardship, and might be most detrimental to health. On the other hand, it is encouraging to learn that a model village, the first of its kind, has been laid out at Giema, under the local Chief (who had been educated at the school for the sons of Chiefs). It is, of course, not perfect in all respects, but "is one of the best laid out and cleanest villages the senior sanitary officer has seen in Sierra Leone." Dr. J. Beringer concludes his report by urging the necessity for a hospital for infectious diseases at Freetown; the only accommodation now available is quite unsuited for the purpose.

Weihaiwei.

This territory, leased to Great Britain by China in 1898, is part of the province of Shantung, and comprises a strip of land 10 miles wide, with a coastline of 72 miles. The island of Liukung, lying east and west across the bay, is also included in the territory, and affords excellent shelter from the sea. Port Edward, on the mainland, is the only port, and is also the seat of government. The total area of the territory is 288 square miles, and the native population at the census of 1921 was 154,416. The foreign population is mainly British, and varies from a small number in winter to several hundreds in summer, when visitors arrive from all parts of China in order to enjoy the salubrious climate. In addition, several thousand personnel of the China Squadron spend a few months each summer in the territory. The summer of 1922 was exceptionally hot, but the rainfall was just above the average. General health conditions among the residents and visiting European population on the mainland were exceptionally good. Apart from three cases of dysentery, there were no cases of infectious diseases. There was one birth and one death. There were several cases of septic sore-throat, probably of an infectious nature, affecting only newcomers to China. The health of the native population was good. During the first and the last two months of the year a number of mild cases of influenza were treated. The number of cases of dysentery and diarrhœa treated was 256, as compared with 350 in the previous year. There were 31 persons holding licences to smoke opium, their average age being 63. The highest mean temperatures in 1922 were 80 in June and 86 in July and August. Rain or snow fell on 78 days, with a total rainfall of 24·84 inches. The snowfall in November was 3 feet, the deepest within the memory of any inhabitant.

Gambia.

In a report prepared by Mr. C. R. Workman, Colonial Secretary, on the affairs of the Colony and Protectorate for the year 1922, it is recalled that the Gambia, though the smallest, is the oldest of the possessions of England in Africa. The population of Bathurst, the chief town, is 9395, with 205 Europeans. The death-rate in 1922 was 46·62 per 1000, the average since 1916 having been 42 per 1000. The chief causes of death were pneumonia and tetanus. Accurate statistics from the Protectorate are not obtainable, but a careful return from the North Bank Province for 1922 gives 1628 births and 905 deaths. In this Province an outbreak of bubonic plague occurred which was traced to a focus in French Senegal; 34 cases were counted, and only four of them recovered. Active measures were taken to isolate the infected villages, and control stations were established on the route to Bathurst. It was only by vigilance and a strict enforcement of regulations that the capital was saved from a visitation of the disease. The meteorological returns from Bathurst for 1922 showed: Average maximum shade temperature, 92·2° F.; average minimum shade, 63·4° F.; average mean, 77·8° F.; rainfall, 45·71 inches.

THE "MINTITE" PATENT FINISH HOT-WATER BOTTLE.

WE have previously reported upon the heat and acid-resisting qualities of "Mintite" patent finish for articles made of indiarubber. This finish, which is an application of mica, is now used for hot-water bottles, and, in addition to the advantages already mentioned, it is claimed that tensile strength is increased. Hot-water bottles treated by this method should certainly possess a longer life than the ordinary untreated rubber article. The patentee is Mr. Louis Minton, Trevelyan Buildings, Manchester.

Summer Time will cease on Sunday next, Sept. 16th, at 3 A.M., when the clock will be put back to 2 A.M. The hour 2–3 A.M. Summer Time will thus be followed by the hour 2–3 A.M. Greenwich Time. Summer Time will be prolonged in France, Belgium, and Holland until Oct. 6–7th.

Mr. F. F. Burghard informs us that he has retired from practice and has left London. His permanent address is Craythorne, Rolleston, Burton-on-Trent, Staffs.

Uniped.—The advantages of the all-metal limb do not in the opinion of the Pensions Ministry experts outweigh the disadvantage of its high cost. The light metal limb with wooden socket which was decided upon by the 1921 Committee, continues to be supplied and to give satisfaction. The wooden Anglesea pattern limb can be made as light or even lighter than the metal limb. Various makers now supply limbs with metal sockets at a price about the same as that which the Ministry is prepared to pay.

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